NOVEMBER 25, 1937

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THE IRON AGE

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DIRT TAKES A HOLIDAY

● Ever since man made the first shaft to turn in a bearing, dirt, that ogre with a million teeth to cut and abrade, has taken its toll in ruined accuracy and shortened life. But New Departure sealed ball bearings have sent dirt on a permanent vacation. They keep it out where it can do no harm — they lengthen the useful life of machines and reduce their maintenance cost.

NEW DEPARTURE *N-D-Seal* Bearings

New Departure · Division General Motors Corporation · Bristol, Connecticut

NOTHING ROLLS LIKE A BALL

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V. 140
NO. 22
N. 25, 1937

The HEADS of the CLASS

Bolts and nuts in all standard and special shapes, sizes, alloys and finishes. Standard and special rivets of all kinds. Wire rope clips. Turnbuckles. Automotive and railroad special items. Headed and threaded products for every use.

Look at those heads . . . full, accurately shaped, strong. They hold wrenches and screw drivers without slippage. They seat perfectly and hold in wood or in holes provided in metal. They speed up assembly. They help to produce better products.

Full heads, strong shanks and clean, free-running threads are three big reasons why Republic Upson Quality bolts, nuts, rivets and other items are the "class" of headed and threaded products.

Write for quotations on your requirements.

REPUBLIC STEEL UPSON

BOLT AND NUT DIVISION

Republic Steel Corporation

GENERAL OFFICES . . . CLEVELAND, OHIO

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Publication Office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 239 W. 39th St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 140, No. 22.

Where finish really counts

Bethlehem *Cold-rolled* Sheets are in their element

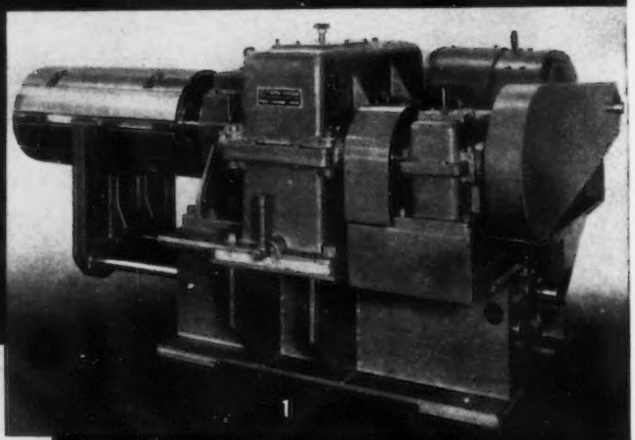
BETHLEHEM makes a specialty of cold-rolled sheets for such exacting jobs as this. In respect to flatness, surface, and uniformity of gage, Bethlehem sheets are consistently pleasing builders of metal furniture—as well as other users of sheet steel.

By whatever standards you measure sheet-steel performance, you will find Bethlehem an exceptionally satisfactory source of supply.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Coilers



1

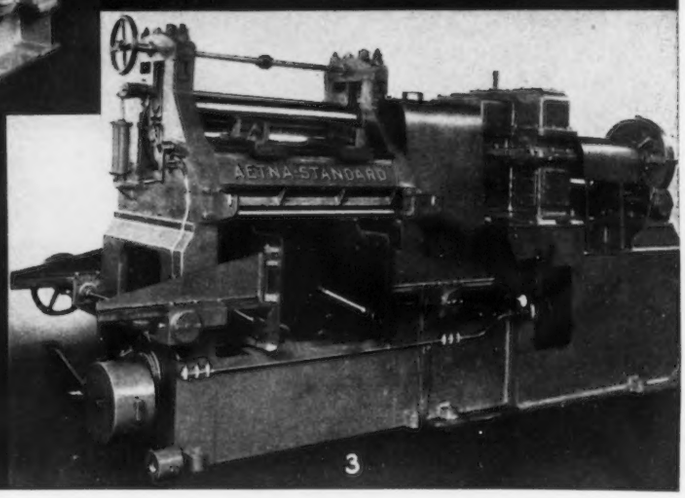
1 . . . TITE COILER

2 . . . UP COILER

3 . . . DOWN COILER

2

Consult Aetna-Standard on complete strip handling equipment for all finishing operations . . . .



3

THE AETNA-STANDARD ENGINEERING COMPANY

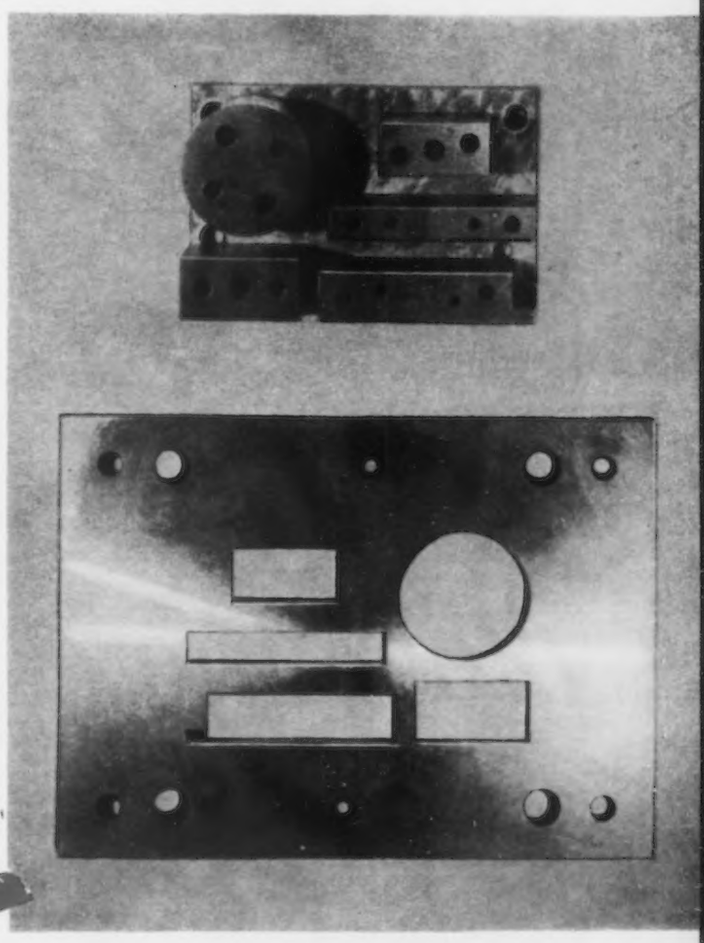
CONSULTANTS · DESIGNERS · BUILDERS

STEEL AND NONFERROUS INDUSTRIES

YOUNGSTOWN « OHIO » U. S. A.

WHY SHOULD I CHANGE TO O-HI-O DIE STEEL?

FOR BETTER RESULTS, OF COURSE



On all dies of a type where high carbon, high chromium steels are desirable, but where the steel must be air hardened in order to have a minimum of movement and warpage, O-HI-O DIE STEEL gives excellent performance.

Vanadium-Alloys

STEEL COMPANY

LATROBE, PA.

No—

IT'S NOT A DOUGHNUT!

It's Steel

WHEN, in an advertisement of several years ago, we showed this actual photograph of a tangled ball of Roebling Cold Rolled High Carbon Steel Flat Wire, it excited much favorable attention and comment—and inspired much wit. It was appropriately called a doughnut, a pretzel, and several other things.

We show it again as one example of the many flat wires we make to meet *exacting* requirements.

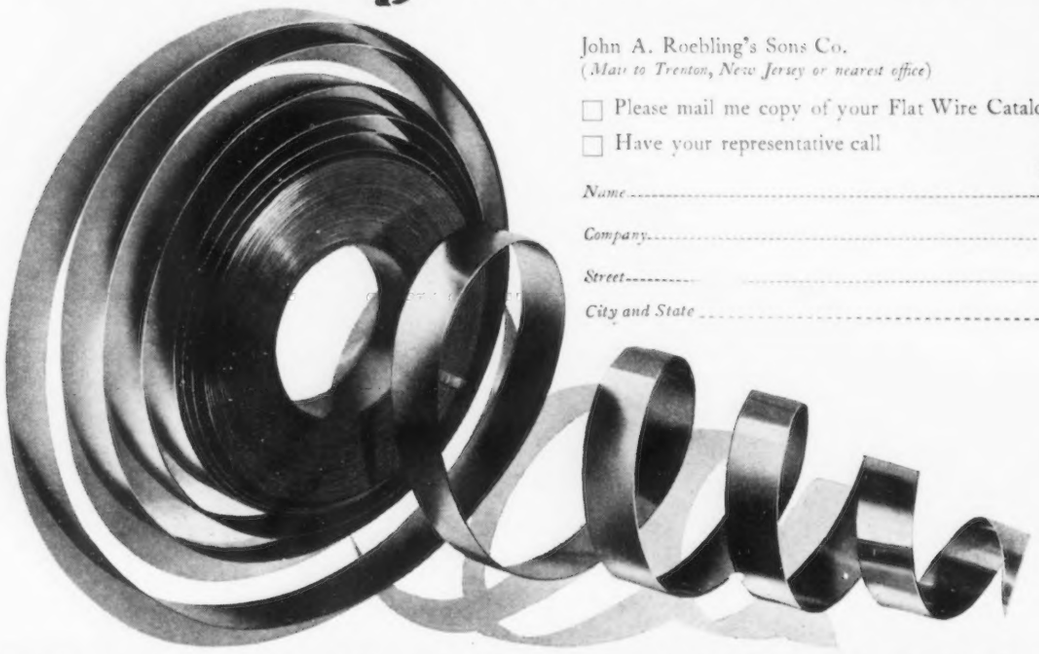
It gets the severest kind of punishment in actual service. It is yanked around, coiled, tangled, bent. But it has to survive.

Naturally it is a very tough and resilient flat wire. Tensile strength—high. Temper—uniform and held within very close limits. Also—accurate dimensionally and notably free of defects on the surface and edges.

We would welcome your inquiry about Roebling Flat Wire, high or low carbons. We specialize in flat wire to meet exacting specifications and have special custom production facilities to handle this type of work.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

Roebling COLD ROLLED STEEL FLAT WIRE



John A. Roebling's Sons Co.
(*Mail to Trenton, New Jersey or nearest office*)

☐ Please mail me copy of your Flat Wire Catalog
☐ Have your representative call

Name _____

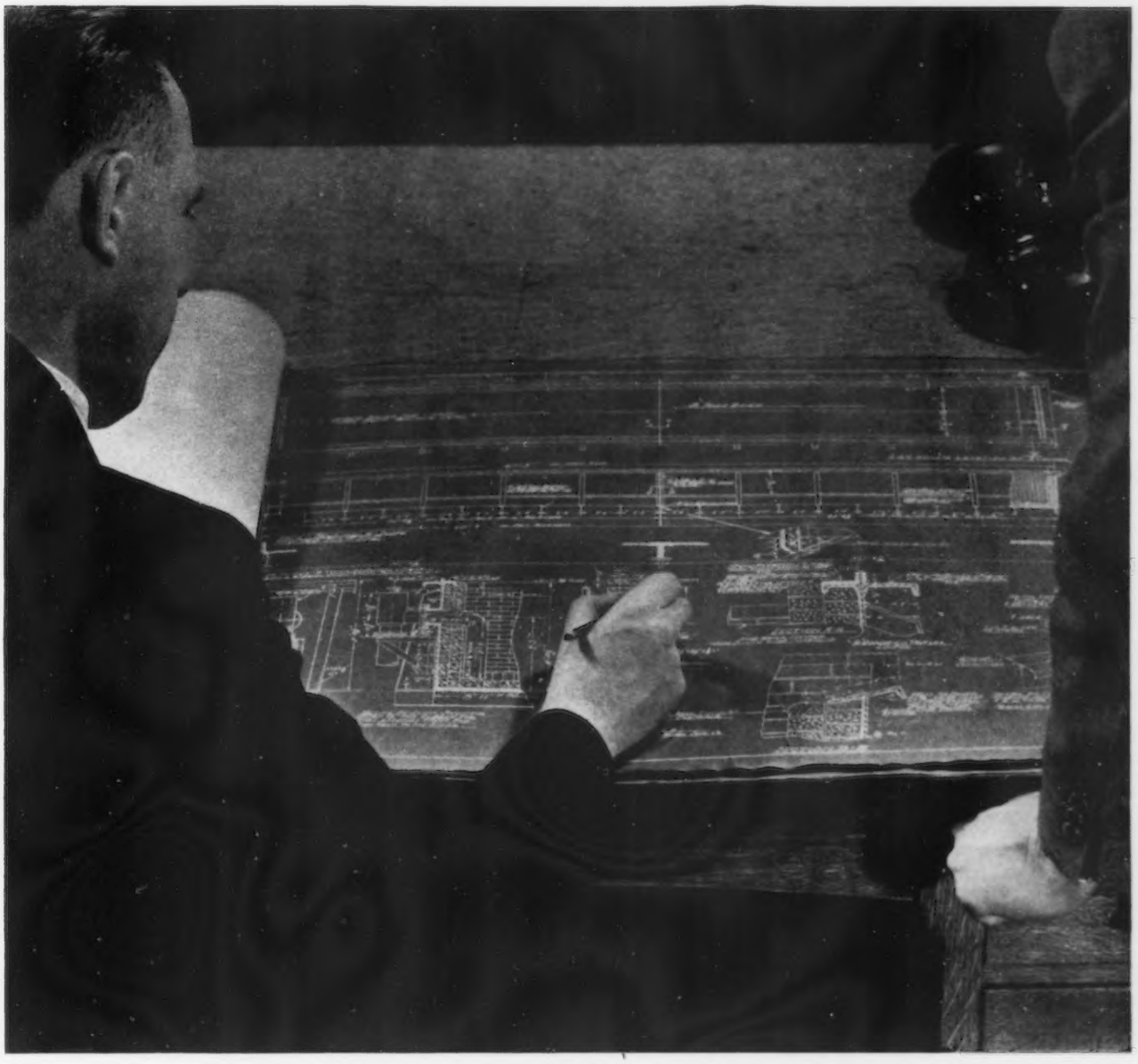
Company _____

Street _____

City and State _____

TRADE MARK JAR REG. U.S. PAT. OFF.

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING



GETS BETTER PICKLING EQUIPMENT FOR $5000 LESS BY USE OF GOODRICH DESIGN

RECENTLY a large steel company was in the market for a continuous strip pickler. They asked for bids from several makers of tank linings and all bid on the proposed design. Goodrich, and Goodrich only, submitted an alternative design, based on Goodrich experience in designing the 30 latest, most modern pickling lines of America. The new design had 19 improvements, *cost $5000 less* than the original.

Goodrich engineers showed how to make the tanks stronger, make tanks and ducts more accessible, provide greater space for fume discharge, conserve plant space, provide better for expansion and contraction, assure a line that would last longer—all these and many other improvements at a saving of $5000.

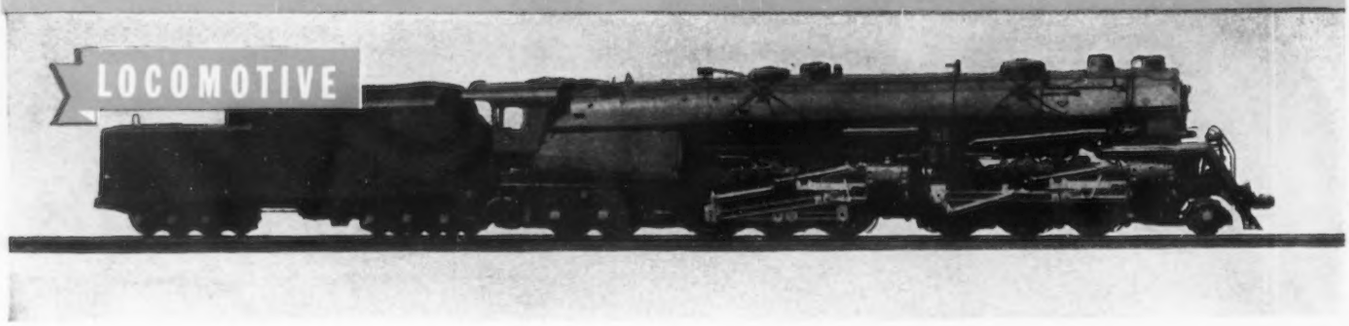
This is the type of service Goodrich engineers can give you, too, because of their long and unique experience in designing modern pickling tanks. Every modern improvement in pickling tanks was designed by Goodrich engineers; every modern pickling line with a record of successful performance is a Goodrich line.

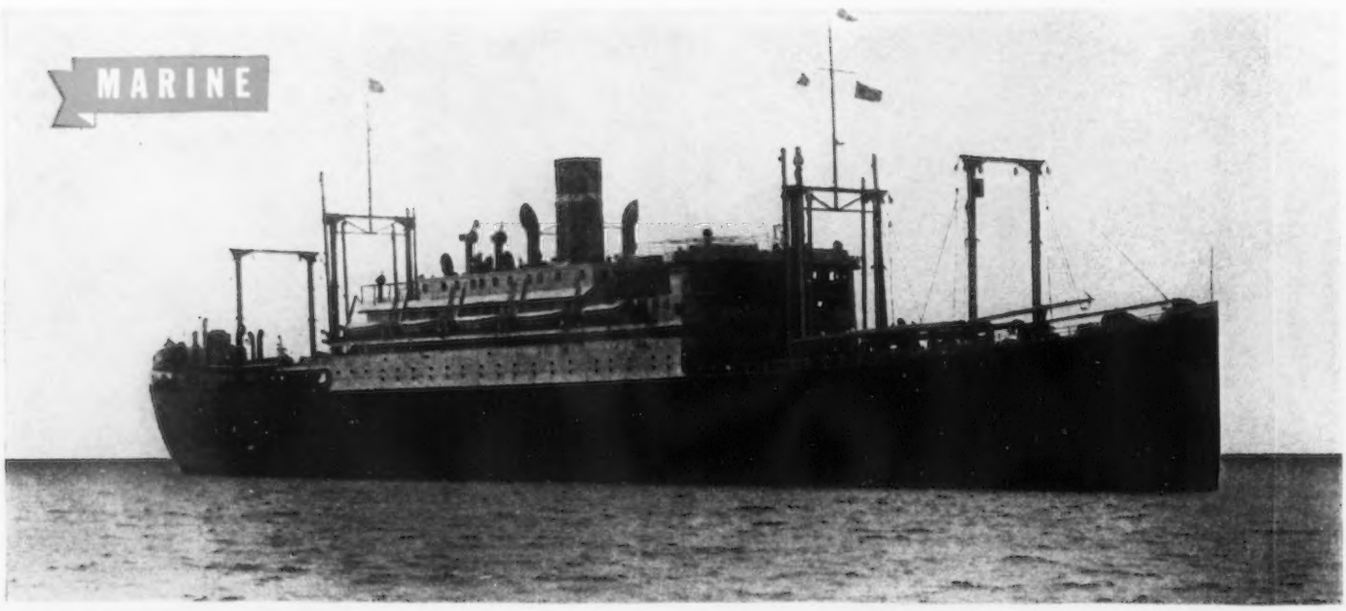
When you can have all this experience, all these years of proven successful performance applied to your job, why take a chance? *Specify Goodrich and be sure.* The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

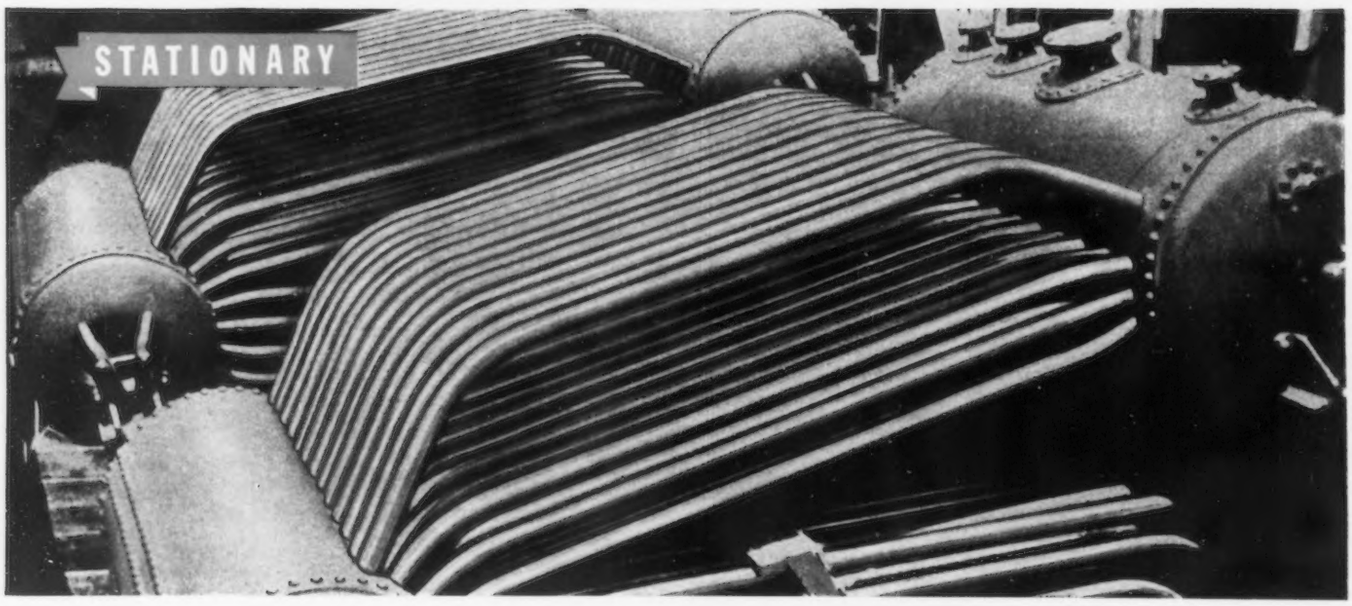
Goodrich

ALL *products problems* IN RUBBER

Well-Beaten







is the Path to -

ELECTRUNITE

REG. U.S. PAT. OFF.

STEEL AND TUBES ELECTRIC WELD

BOILER TUBES

It's the "Economy Highway" — this path so well beaten by industry's orders and re-orders for the millions of feet of ELECTRUNITE Boiler Tubes now in service. It's the road over which users of boiler tubes have sped to new, economical boiler and power costs.

Such wide acceptance of a new product in four short years demands a reason. Only by cold forming and electric resistance welding flat-rolled steel by Steel and Tubes' exclusive process is it possible to obtain consistently the uniformity in roundness, diameter, wall thickness and weight — the high ductility — the fine, scale-free surface — and the freedom from concealed defects which have made ELECTRUNITE the choice of boiler, condenser and heat-exchanger manufacturers and users.

You'll find the complete story of this modern boiler tube interesting — and profitable. Write for it.

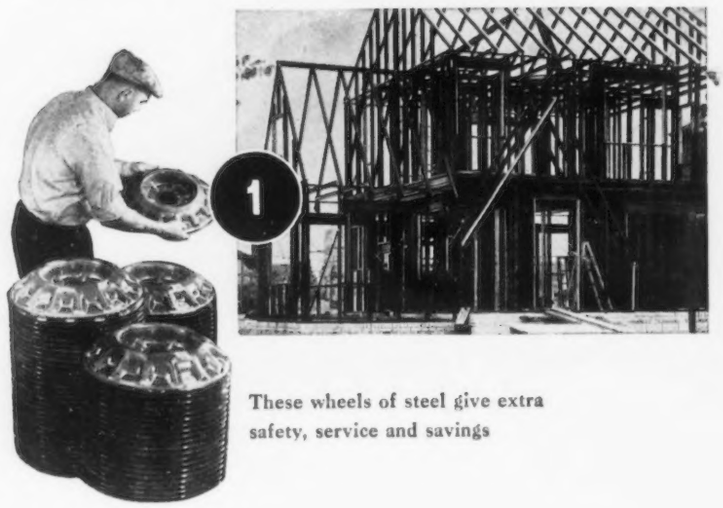
Steel and Tubes, *Inc.*

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . . OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION

Why not make it of STEEL?



These wheels of steel give extra safety, service and savings

MANY AN INDUSTRY DID . . . and found steel adds *to sales and* subtracts *from costs — with almost mathematical certainty*

MANUFACTURERS in scores of fields today are discovering that steel offers unusal opportunities not only to improve the quality and salability of their products, but also to cut costs — and therefore to increase profits.

By its own program of continuous development, Great Lakes Steel Corporation keeps fully abreast of today's growing demand for steel. Great Lakes strip has superior drawing properties and finish. Great Lakes sheets, hot- and cold-rolled, up to 90" wide and 5/16" thick, greatly increase the fields that steel can serve with economical efficiency.

Why not make *your* product of steel?

May we show you how Great Lakes Steel can help on some problem of design or redesign in *your* plant?

GREAT LAKES STEEL CORPORATION, DETROIT, MICHIGAN

DISTRICT OFFICES: *Boston*, 1001 Statler Building; *Chattanooga*, Hamilton Bank Building; *Chicago*, 1026 Builders Building; *Cleveland*, 820 Leader Building; *Dayton*; 1215 Circle Tower; *New York*, 500 Fifth Ave.; *Philadelphia*, 605 Liberty Trust Building; *St. Louis*, E. R. Hensel Co., Cotton Belt Bldg.; *San Francisco*, Sharon Bldg.,

UNIT OF NATIONAL STEEL

NATIONAL

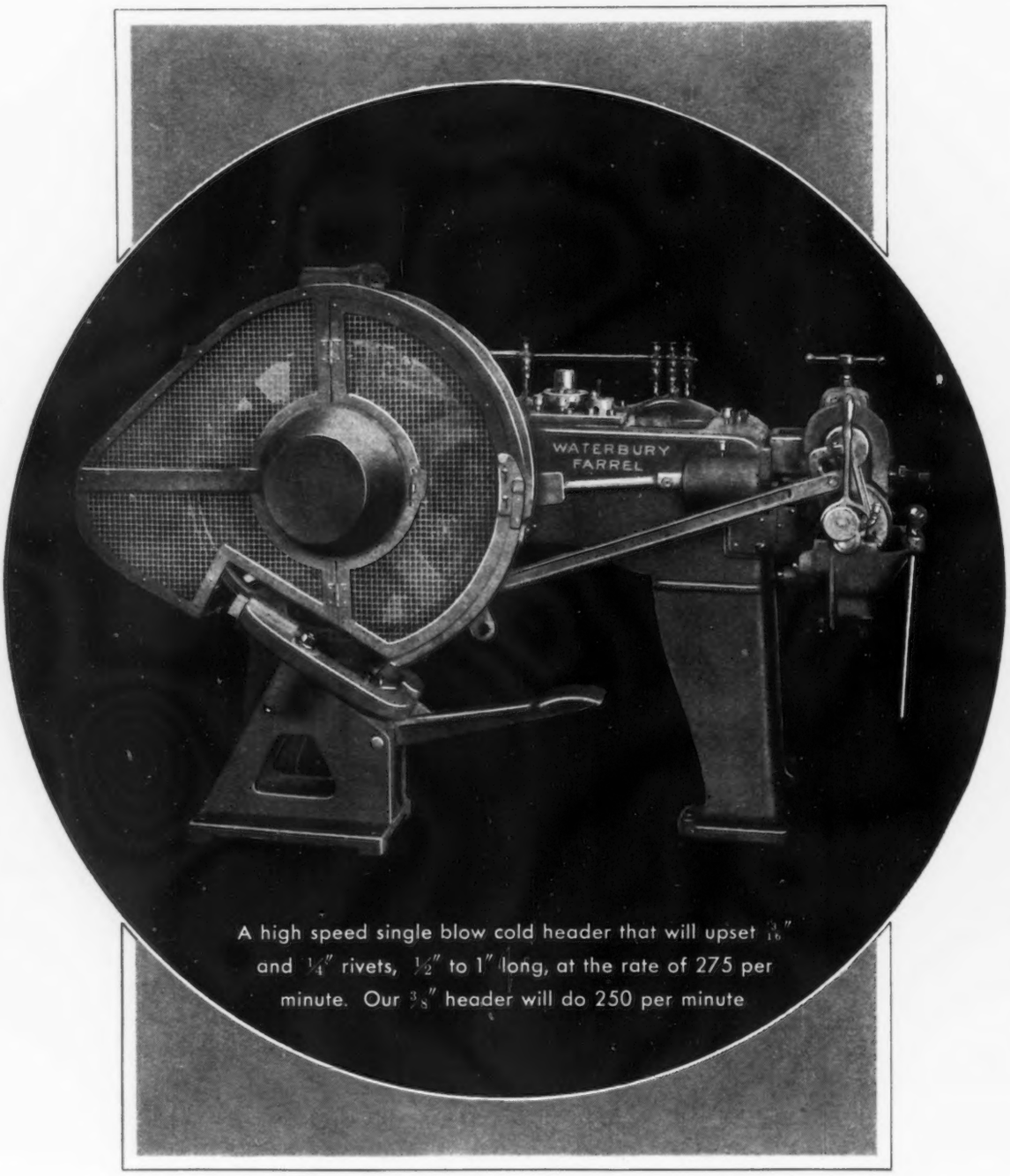
1 — Stran-Steel for permanent fire-safe building
2 — Steel helps beautify an office
3 — Seamless steel milk cans guard health
4 — Steel containers protect profits
5 — Steel fronts attract shoppers
6 — Steel fixtures "dress" a store
7 — Happy motoring depends on steel
8 — Steel starts a trailer on its way

846 Third National Bank Building; *Indianapolis*, *Toronto, Ontario*, General Assurance Building.

HOT ROLLED STRIP . . CARBON STEEL BARS . . PLATE . . SPRING STEEL . . BILLETS . . COLD ROLLED SHEETS . . PICKLED SHEETS . . BLACK SHEETS . . MICHIGAN METAL FOR VITREOUS ENAMELING . . *Widths up to 90"*

STEEL CORPORATION

275 RIVETS PER MINUTE!
ON WATERBURY FARREL HEADERS



A high speed single blow cold header that will upset 3/16" and 1/4" rivets, 1/2" to 1" long, at the rate of 275 per minute. Our 3/8" header will do 250 per minute

The Waterbury Farrel Foundry and Machine Co.

HOME OFFICE AND WORKS: Bank and Meadow Sts., Waterbury, Connecticut

Sales Offices: Cleveland - - - Chicago - - - Newark, N. J.

OXWELD* SHAPE-CUTTING MACHINES

cut steel with quality results

THE quality results obtainable in shaping steel with an Oxweld oxy-acetylene cutting machine help speed up production and lower manufacturing costs.

Consider the stationary Oxweld CM-12—one of a line of new and improved shape-cutting machines. With the CM-12, it is possible to cut steel parts to dimensions within close tolerances in a single cut. The CM-12 combines precision with ease of operation. Automatic repetitive cutting on a production basis and profitable fabrication of special items are readily achieved with the CM-12.

A Linde representative will gladly co-operate with you in determining the economies which you can obtain with flame cutting. The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, New York and principal cities.

*Trade-Mark

THE OXWELD CM-12 CUTS SHAPES AUTOMATICALLY or by hand guidance and cuts straight lines, circles and bevels automatically. It has a cutting range of 51 inches in width by 144 inches in length. Cutting speeds range from 1½ to 75 inches per minute. It cuts any thicknesses practical for oxy-acetylene machine cutting.

Everything for Oxy-Acetylene Welding and Cutting

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES FROM UCC LINDE UNION CARBIDE

New Industrial Literature

A REVIEW OF CURRENT CATALOGS AND CIRCULARS • A TIME SAVING SERVICE FOR BUYERS

Order by number literature wanted. No Cost. No Obligation. Address The Iron Age 239 West 39th St. New York City

BEARING APPLICATION.—Timken Roller Bearing Co. A 52-page, profusely illustrated supplement to the Timken Engineering Journal. Issue covers the application of single and double row bearings to oil field equipment. Engineering data and working plans will be of particular interest to designers and builders of oil field equipment. Bulletin 11-71.

AIR FILTERS.—Independent Air Filter Co., Inc. Bulletin describes completely the features of the Double-Duty, all-steel, self-cleaning air filter. Capacity and dimension tables, together with a list of users are included. Bulletin 11-72.

PRESSURE AND TEMPERATURE CONTROLLERS.—Foxboro Co. Folder describes the significance of the seal of certification which is now attached to all Foxboro instruments. Also illustrated are more than twenty controlling instruments, representative of the Foxboro line. Bulletin 11-73.

COLD SAW CUT-OFF MACHINES.—Consolidated Machine Tool Corp. Bulletin No. 535 describes Newton cold saw cutting-off machines with hydraulic feed which is claimed to eliminate feed shafts, gears, clutches, etc., and in this manner add to the life of the machine. Machines are available in capacities for handling up to 25¾ in. round stock. Bulletin 11-74.

HEATING AND COOLING EQUIPMENT.—Trane Co. October issue of "Weather Magic" which describes and illustrates several new and unusual applications of convection type heaters and coil cooling units. Also included is an instructive discussion on the use and construction of bucket traps. Bulletin 11-75.

SAFETY APPAREL.—Industrial Gloves Co. New catalog describing "Steel-Grip" safety apparel. Illustrations cover all types of hand and body guards for industrial plant use. Bulletin 11-76.

DUST PROBLEMS.—Mine Safety Appliances Co. Booklet answers some important questions regarding the nature and effects of various dusts. Several types of respirators are illustrated. Bulletin 11-77.

TRUCK BODIES AND HOISTS.—Gar Wood Industries, Inc. Two 6-page bulletins covering the construction features of heavy duty truck bodies and heavy duty cam and roller hoists. The problem of proper application of hoisting mechanisms is comprehensively covered. Bulletin 11-78.

STEEL JOISTS.—Bethlehem Steel Co. Booklet covers the design and application of open web steel joists, both welded and expanded types, as applied to building and bridge construction. Included are tables which show the total safe load that may be carried with various joist spacings. Bulletin 11-79.

MINE HOISTS AND STOPPERS.—Sullivan Machinery Co. Two bulletins, one covers portable shaft hoists suitable for use with gas, diesel, or electric power units, and the other covers automatic stoppers. Complete specifications are given and various construction features are discussed in detail. Bulletin 11-80.

CAPACITORS.—General Electric Co. Spiral bound brochure describes the materials and construction methods used in building G-E Pyranol capacitors. Photographs cover each step in detail and samples of some of the materials used are enclosed. Pyranol, the insulating liquid used in the capacitors, is said to be non-inflammable and non-explosive. Bulletin 11-81.

PYROMETERS.—Bristol Co. Bulletin covers Pyromaster, a newly developed potentiometer with a simplified operating mechanism. Use of this instrument as a pyrometer, a resistance thermometer or a millivoltmeter is described. Bulletin 11-82.

FIRST AID EQUIPMENT.—Mine Safety Appliances Co. New bulletin describes garment known as the M.S.A. Anatomical Shirt for practical and graphic instruction in the location of arteries, bones and organs of the torso and arms, essential to a working knowledge of first aid. Bulletin 11-83.

STELLITE.—Haynes Stellite Co., Kokomo, Ind. Booklet listing available Haynes Stellite books, reprints and other literature dealing with hard-facing alloys, cutting tools and alloys for chemical processing equipment. Bulletin 11-84.

AIR FILTERS.—Northern Blower Co. Bulletin describes and illustrates Norblo square type air filter. Bulletin 11-85.

METALLURGICAL TEST EQUIPMENT.—Harry W. Dietert Co. Bulletin announces two new microscopes for examination of castings, foundry sands, machine parts and specimens; a routine metallographic unit for microscopic and photo-micrographic examination of specimens, and also a metallographic polishing machine. Bulletin 11-86.

ALLIGATOR SHEARS.—Doelger & Kirsten, Inc. Catalog describes alligator shears adapted for various types of drives. Exceptionally long life for the machine is claimed due to the patented wedge frame construction used. Shears may be had in portable and non-portable types, and in capacities up to 6 in. square stock. Bulletin 11-87.

ELECTRIC HARDENING FURNACES.—General Electric Co. Bulletin GEA-2790 provides complete information on electric furnaces for scale-free hardening. Furnaces are of the conveyor type and are for use with protective atmospheres. Bulletin gives data on construction, loading methods, temperature control and operation. Photographs of typical installations included. Bulletin 11-88.

DUST COLLECTORS.—Claude B. Schneible Co. Bulletin covers the junior multi-wash collector for use where a small, low-cost collector is needed. Lack of moving parts and nozzles is said to reduce maintenance costs. Capacities and dimensions included. Bulletin 11-89.

FLOOR RESURFACER.—Flexrock Co. Folder describes the use of Ruggedwear floor resurfacer for repairing floors of railroad stations, bridges and industrial plants. Material is said to set in 30 hours and bonds to a feather edge. Bulletin 11-90.

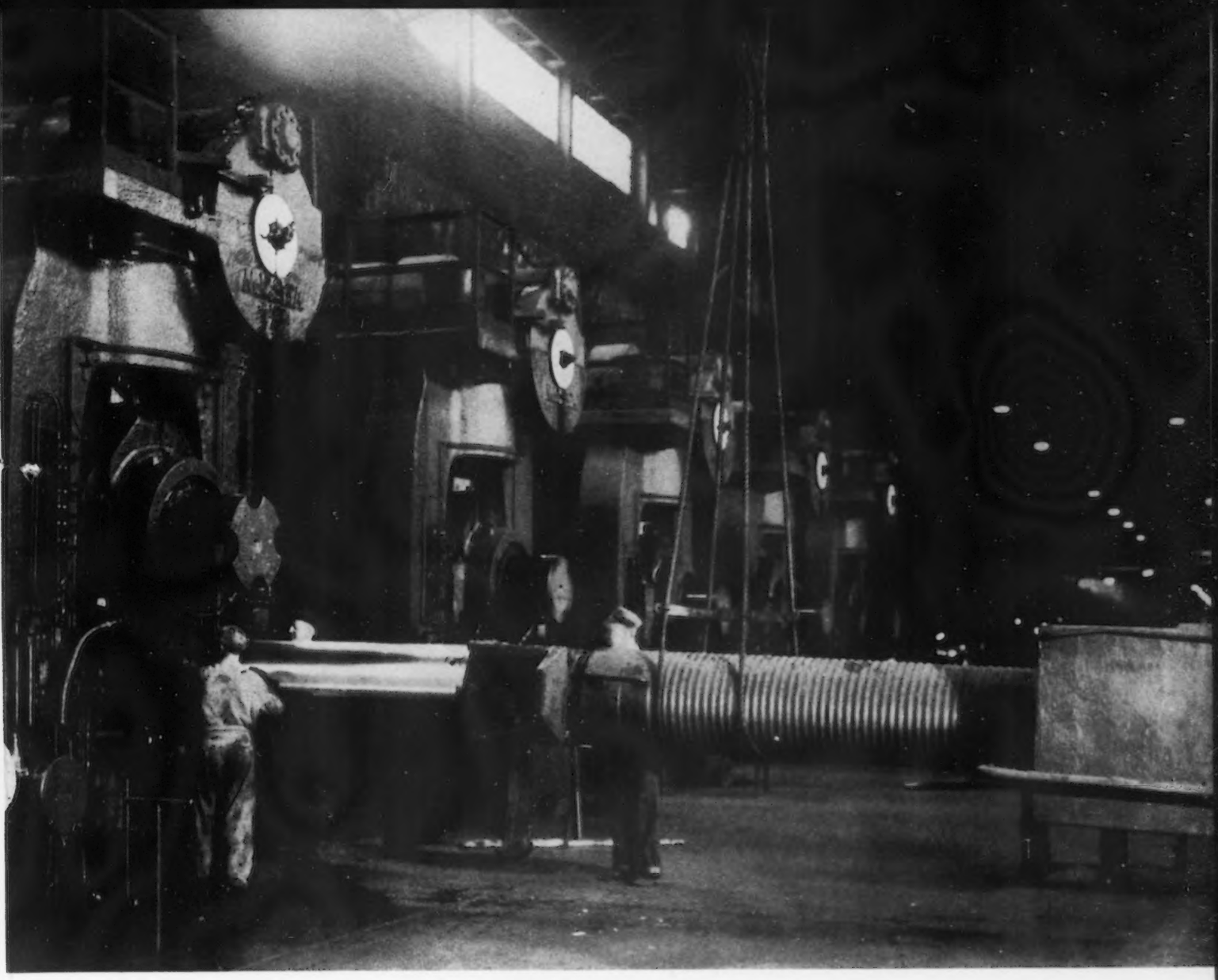
LIGHTING EQUIPMENT.—Benjamin Electric Mfg. Co. Revised edition of catalog No. 26 which contains information on recent improvements and developments in industrial lighting equipment. Catalog has 352 pages and gives complete data on the Benjamin line, as well as providing detailed information on floor layout plans, lighting efficiency curves, and other subjects of interest to lighting engineers. Bulletin 11-91.

BENCH SHAPERS.—Atlas Press Co. Folder announces a new 7 in. precision bench shaper designed especially for tool room and pattern shop where accuracy and compactness is desired. Maximum stroke is 7 in., and cutting speed is adjustable between 45 and 200 strokes per min. Ram head is driven by crank-type mechanism through V-belts. Bulletin 11-92.

ELECTRIC MELTING POTS.—Harold E. Trent Co. Leaflet describes electric melting pots and various other types of electrically heated equipment, as well as automatic controls for use with this equipment. Design of equipment makes it possible to pour babbitt metal directly into bearing from pot without intermediate handling. Bulletin 11-93.

NAILS, RIVETS AND SCREWS.—John Hassall, Inc. Bulletin describes and illustrates special headed products produced by the company. Nails, rivets, escutcheon pins, screws, etc., are available in a wide assortment of metals. Bulletin 11-94.

*** IF YOU WANT YOUR NEW CATALOG OR LITERATURE LISTED HERE SEND A COPY TO ABOVE ADDRESS**



PICTURE OF A YOUNGSTOWN MILL SERVING A CUSTOMER . . .

"I've seen the mill do flip-flops for a customer -- change rolls, work all night to get a new analysis, turn the whole place upside-down just because some customer was in trouble and needed help in a hurry."

To be able to serve customers in that way, Youngstown's mills *are scheduled by the sales department and operating department working together.* It would be simpler for us if we followed the usual procedure and let the operating department schedule production in the manner easiest for them. But, you see, we operate on the old fashioned idea that your convenience and your needs are more important than ours.

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars Rods - Wire - Nails - Unions - Tie Plates and Spikes.

11-2

HOT ROLLED SHEETS — TRADE MARK — YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - - YOUNGSTOWN, OHIO

YOUNGSTOWN

BETHLEHEM PIPE

Uniformly soft steel, freedom from hard spots make for the easy and accurate threading that means fast work and a good job.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

NOW—
GET BOTH Wide Welding Range Plus Quality
FROM LIGHT-GAUGE WELDING UP TO HEAVIEST PLATE
FULL-RANGE QUALITY PERFORMANCE

AN arc welder meets modern needs for profitable fabrication and repair work only when it provides a faultless output of current for light-gauge welding as well as for heavier work.

Both a wide welding range and faultless output at all points in that range are provided exclusively by the modern G-E single-operator arc welder, with its new, improved features of design and performance. You can turn the current on full tilt, cut it down to a trickle, or set it anywhere in between — you get a "peppy," stable arc at all points in the entire range. It meets Navy specifications on every adjustment.

But why not ask the nearest G-E arc-welding distributor or G-E sales office for a demonstration of this modern arc welder? Or write General Electric, Schenectady, N. Y., for descriptive bulletin GEA-1440F.

To give you the right equipment, General Electric builds the largest and most complete line of arc welders in the world.

GENERAL ELECTRIC

Filing No. 8748

140-71

VANCORAM FERRO-ALLOYS

FERRO-VANADIUM
Open Hearth, Electric and Crucible Grades

FERRO-SILICON
15%, 50%, 75%, 80-90%, 90-95%

FERRO-TITANIUM
High, Medium and Low Carbon Grades

FERRO-CHROMIUM
High Carbon Grade (4 to 6% carbon).
Low Carbon Grades (from maximum .06% carbon to maximum 2% carbon).
Special Iron Foundry Grade

ALSIFER
The Ferro-Silicon-Aluminum Deoxidizer Without a Disadvantage.

CHROMIUM METAL

•

These grades of Vancoram Brand Ferro-Chromium are carried in stock and supplied as required in large lumps, or crushed or ground to various sizes. Write for complete information.

METALS VANCORAM ALLOYS

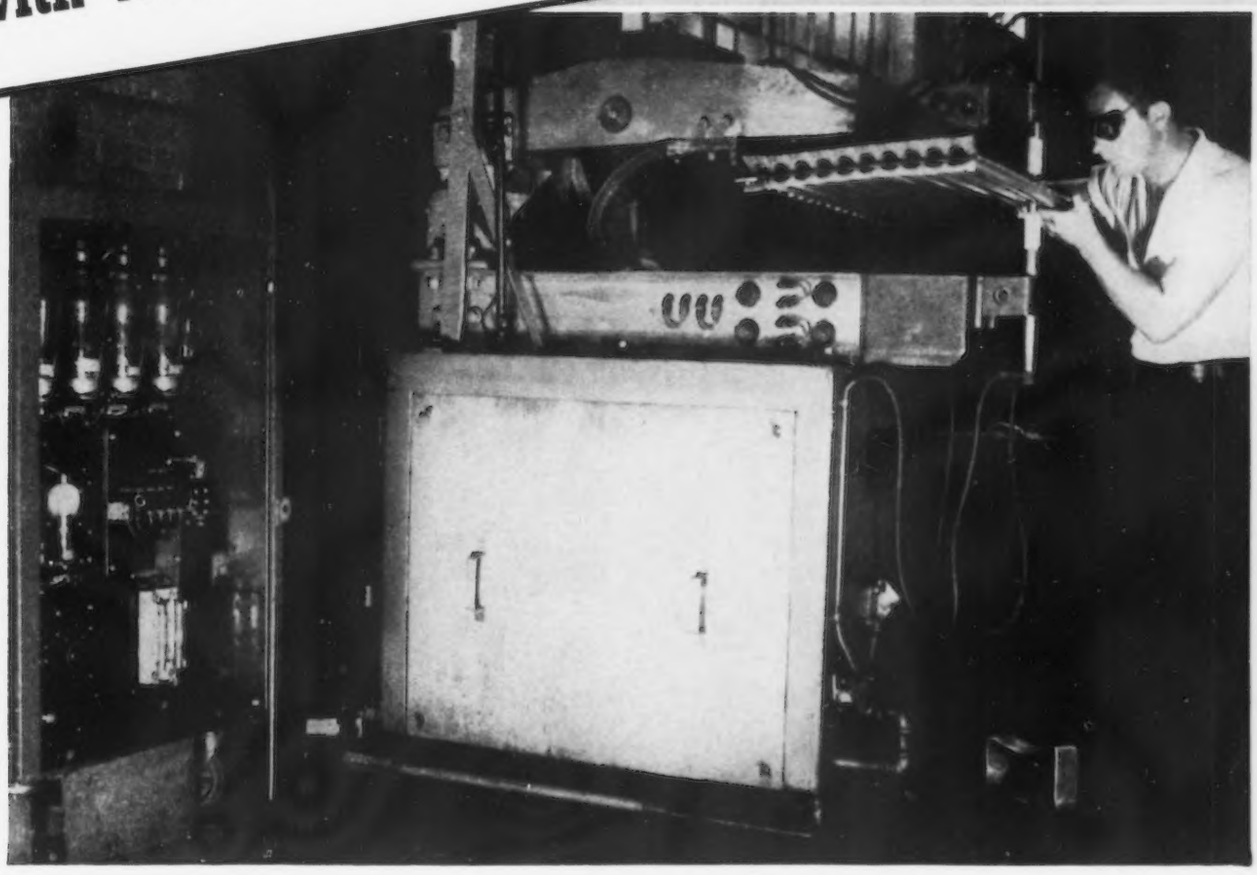
FERRO ALLOYS
of vanadium, silicon, chromium, and titanium, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK, N. Y.
Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories, Bridgeville, Pa.

VANADIUM STEELS

FOR STRENGTH • TOUGHNESS • DURABILITY

WELD ALUMINUM AT PRODUCTION SPEED with Westinghouse Ignitron Split-second Control!



Spot-welding instead of riveting permits the Aluminum Company of America to cut costs and improve production. Westinghouse Ignitron Control is used on this welder.

DO YOU USE RESISTANCE WELDING *for*

ALLOYS
ALUMINUM
BRASS
COPPER
NICKEL
STEEL
STAINLESS STEEL
TUNGSTEN

or combinations of these metals? If so, it will pay you to investigate Ignitron Welding Controls. Write today for booklet B 2123. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Difficult welding operations, such as offered by aluminum and low-resistance alloys, now can be handled on a production basis with Westinghouse Ignitron Controls. By using resistance welding instead of more costly fabricating methods, you speed up production, cut costs, and improve quality—all of which will be reflected in your profits.

And—the constant dependability and precision of Ignitron controls, with welds of as low as 1–120 of a second in duration, virtually eliminates discoloration, warping, burning, and other imperfections resulting from variable or inadequate timing and current controls.

Westinghouse Ignitron Controls can be easily applied to your present welding equipment—and can be supplied for new welders if you so specify.

If you want to speed up production and improve welding quality, investigate Westinghouse Ignitron Timer Controls. Westinghouse engineers are available to consult with you, upon request. J 20451

W WESTINGHOUSE ELECTRIC

Westinghouse *Ignitron Control* for **RESISTANCE WELDING**

When you want

Bent, twisted, crimped or cut — American Quality Wire helps you make fine products.

USS

GOOD WIRE . . .

Let your needs determine the specifications
Let our experience guarantee the quality

TROUBLE-FREE production and satisfactory performance of your product are possible only when the materials you use are *just right*. That's why it is important to use wire made to specifications determined by your production needs.

Whether you need wire for one of the thousands of recorded uses, or for new uses resulting from new developments, American Quality Wire will meet your requirements—*exactly* and uniformly. Our experienced engineering staff can help you decide just what properties are best for the wire you use.

Manufacturers Wire made by the American Steel & Wire Company is uniform in those characteristics important to trouble-free production and satisfactory performance of your product. Our workmen, our excellent facilities, our use of only the best of raw materials . . . plus long wire-making experience . . . are guarantees to you that when you use American Quality Wire, you can rely on it to help you make a product of high quality.

American Quality Wire is available in a wide range of sizes, grades, shapes and analyses. Let us help you determine which wire will do the best job for you.

Premier Spring Wire · Weaving Wire · Pin Wire · Bolt, Rivet and Screw Wire · Broom and Brush Wire · Pinion Wire · Basic and Bessemer Screw Stock · Premier Tested Welding Wire · Flat Nut Stock · Hair Pin Wire · Mattress Wire · Music Spring Wire · Piano Wire · Amercut Cold Finished Steel Bars · Pump Rod Bars · Wool Wire · Also, U·S·S Stainless and Heat Resisting Wire

U·S·S AMERICAN QUALITY WIRE

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* United States Steel Products Company, New York, *Export Distributor*

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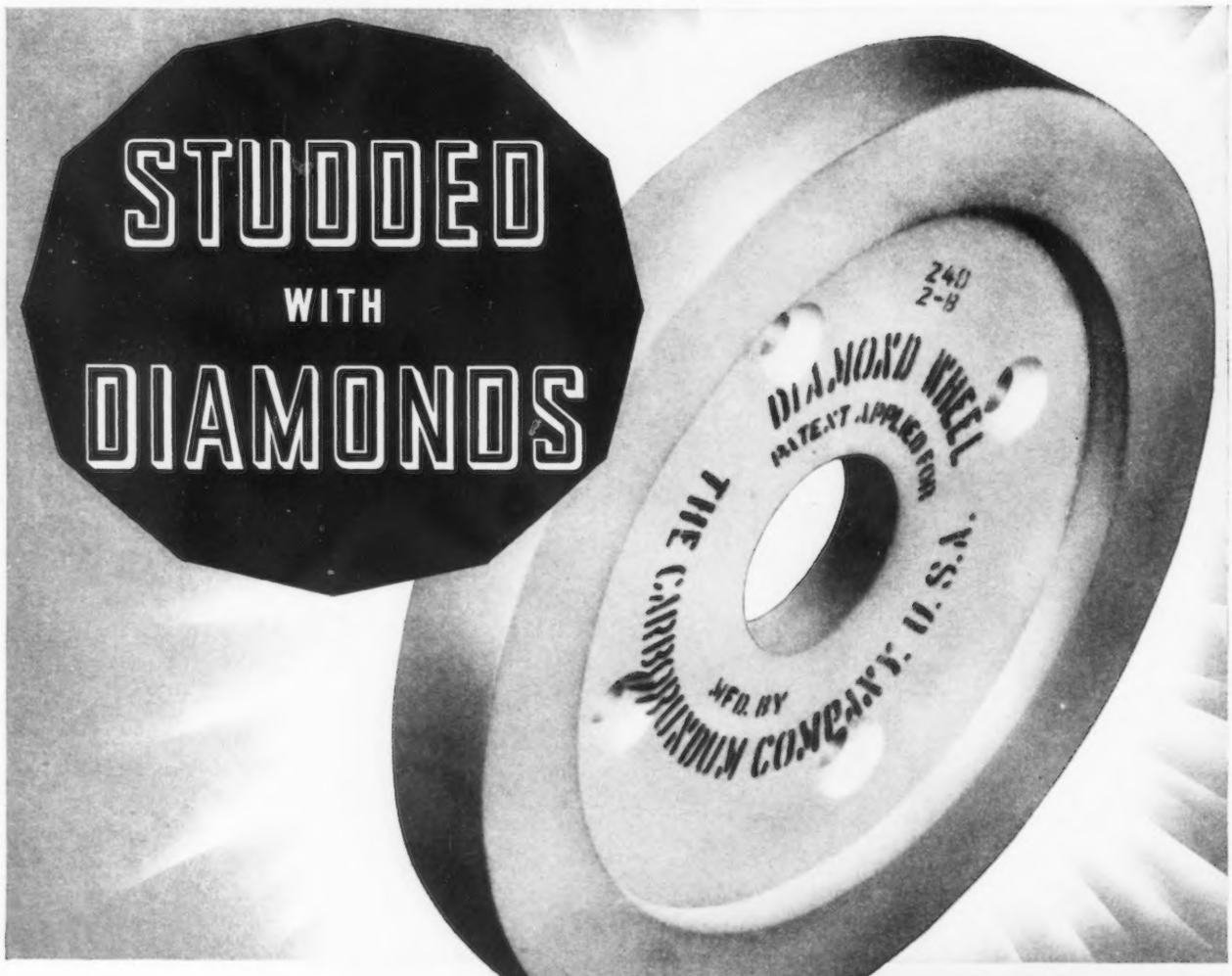

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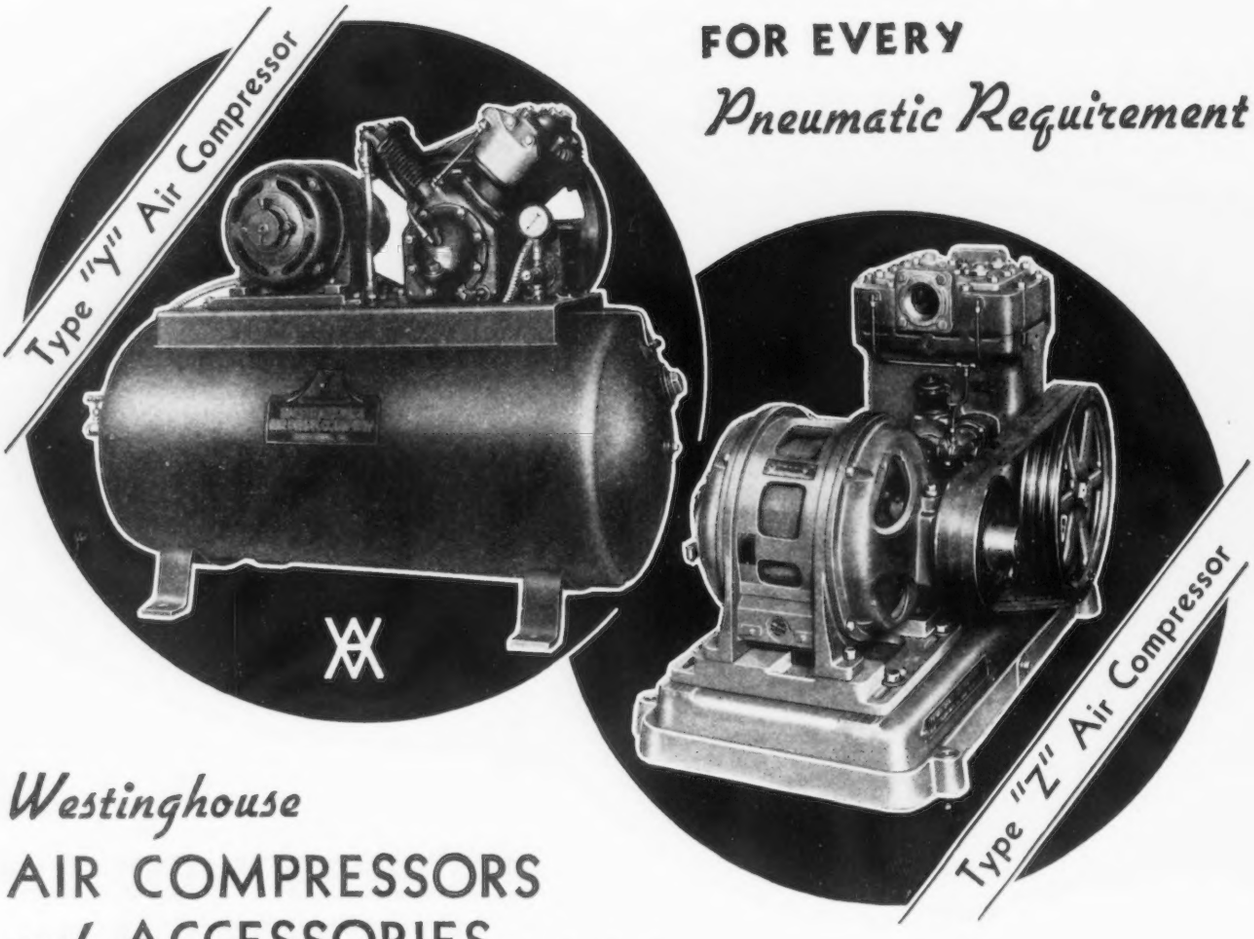

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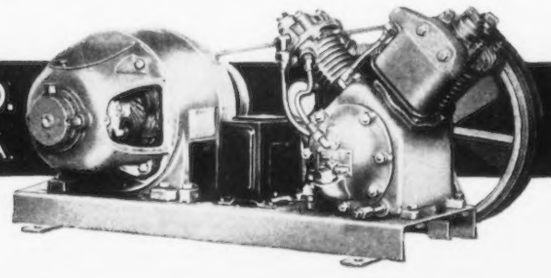

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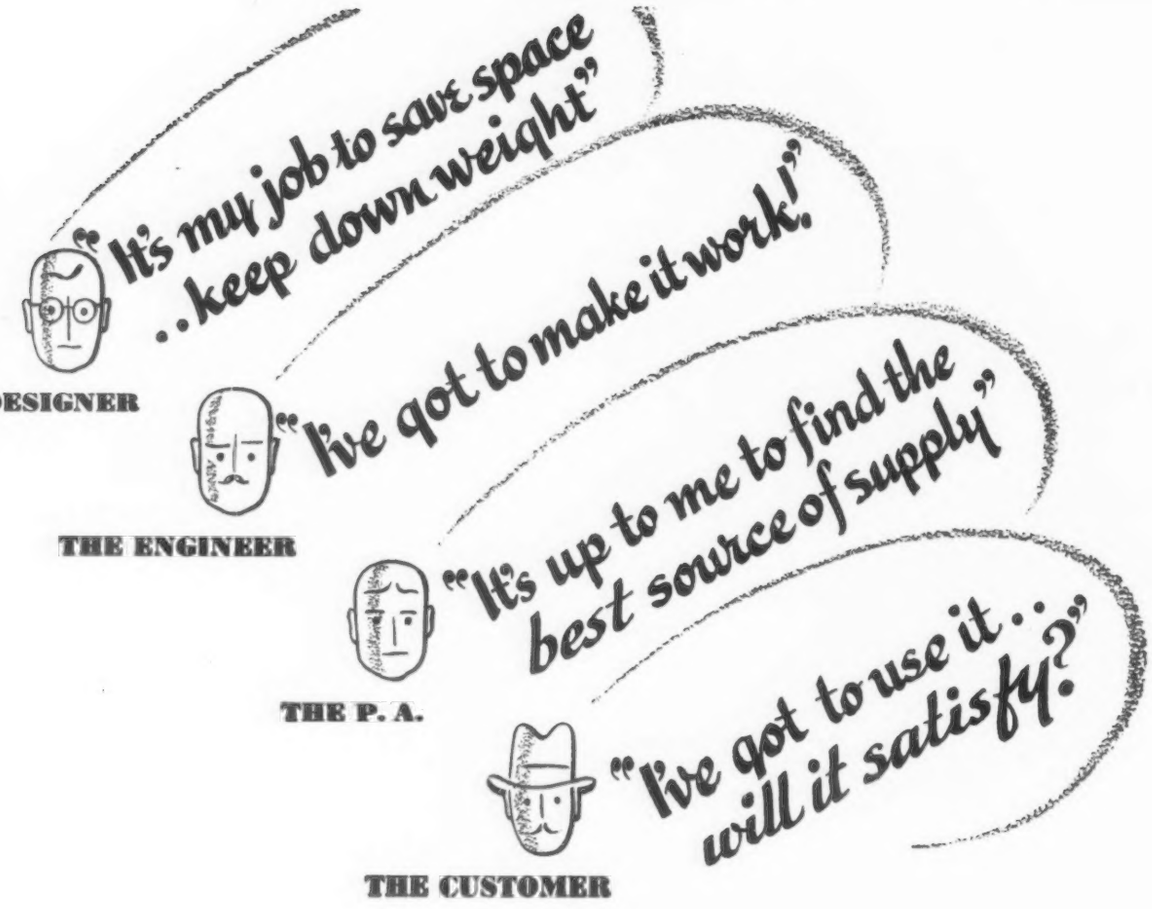
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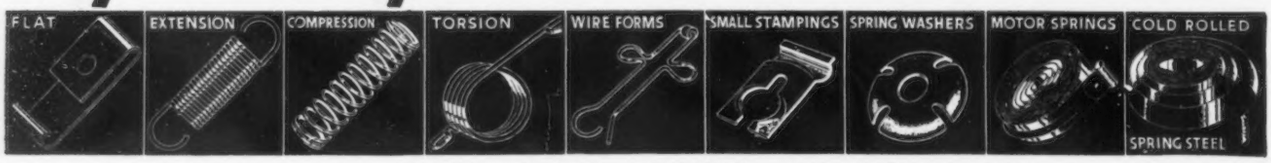

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THE IRON AGE

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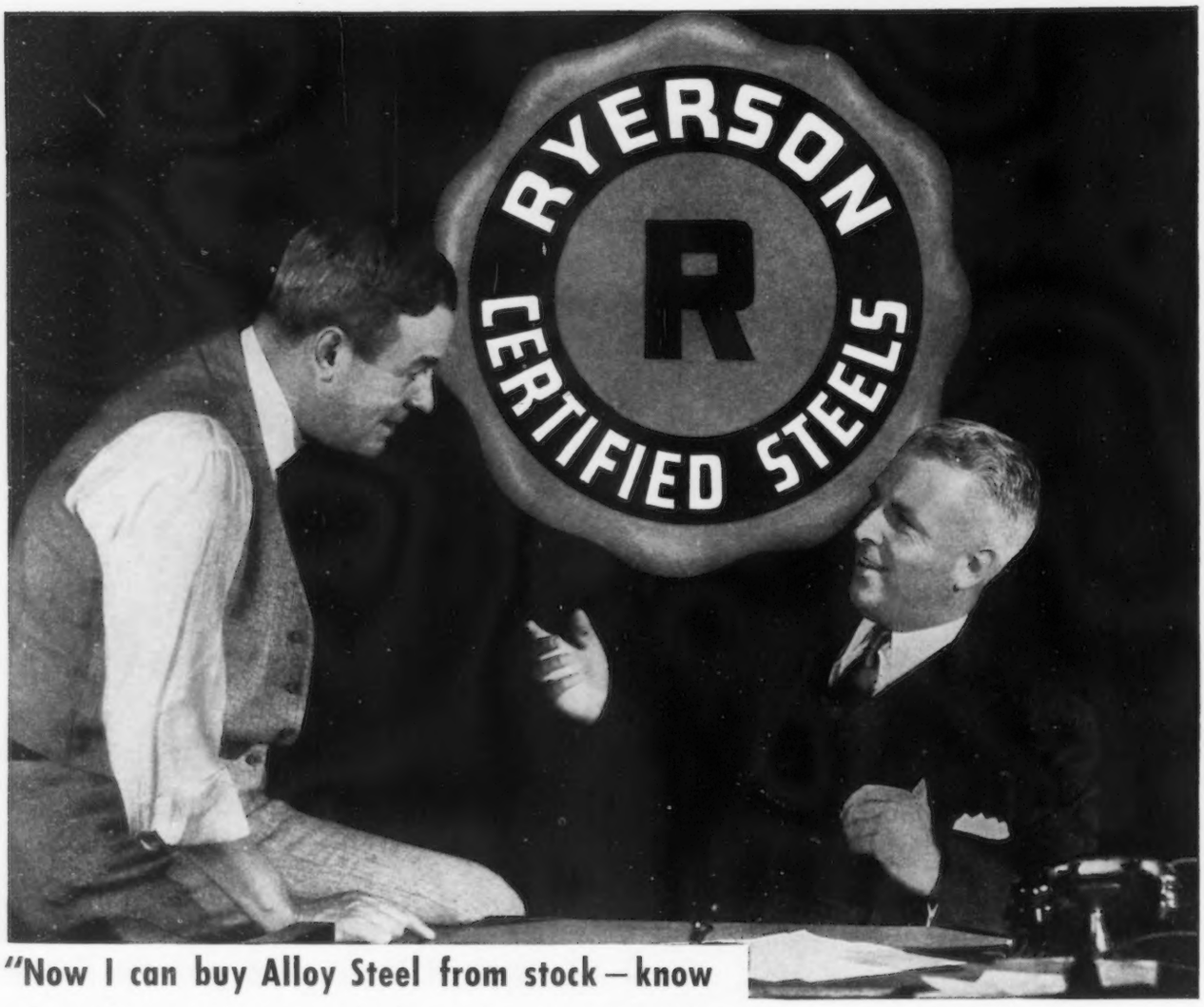

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November 25, 1937

ESTABLISHED 1855 Vol. 140, No. 22

"Industry Must Take Up the Slack"

ALL right, Mr. President, but you will have to let go of the rope.

Let's take the case of the capital goods industry, for that is where the employment slack is now accumulating. The steel industry is an important and typical part of this. Steel production is a good barometer of capital goods activity. When capital goods are selling in satisfactory volume, the steel business is good. When it is not good, you may be sure there is lessened demand for capital goods.

Up to a few months ago, the steel industry **had** taken up **all** of its employment slack. More people were working full time in this industry in April of this year than in the peak of the pre-depression boom. And more steel was being made and sold.

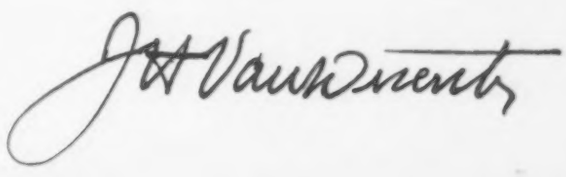
Now steel mills consider themselves lucky if they are working three days a week. In the past two and a half months the operating rate has dropped from 83 to 35 per cent of capacity.

What brought about this exceedingly abrupt change? Did steel buyers come suddenly to the conclusion that twice as much steel was being bought as needed? No indeed, the need for steel is as great as ever, and mighty little of that which had been produced during the upturn went into stock. It went into projects.

The trouble is that all over this country, people who supply the lifeblood of the capital goods industry by investing in new projects, with hope of future profits, suddenly got cold feet. An accumulation of events which had spread over a long period culminated in the conclusion that profit seeking is becoming too hazardous an occupation. Confidence dwindled, flow of money into capital investment dwindled, projects dwindled, operations in steel dwindled. Only one thing increased and that is unemployment.

What was the chain of events that culminated in the destruction of investor confidence? Vilification of employers, persecution of utilities, connivance at sit-downs and disregard of law in strike activities, expressed contempt for constitutional procedure, growing competition of Government with private enterprise, the Corporate Surplus Tax, the threat to revive the defunct and discredited NRA and AAA, the alarming increase in National debt, the insistence upon Federal control of wages and hours, unwanted both by employers and labor, the biased attitudes and actions of the Labor Board, the attempt to pack the Supreme Court, the ensuing "revenge" in the appointment of Ku-Kluxer Black, the threat to involve us in foreign entanglements, the smashing of stock values through pronunciamento, the rule of America by kitchen cabinet.

Industry is willing and eager to take up the slack, but before it can do so, Congress will have to undo some of these knots.



Metal Finishing Economics

Nickel Plating Keeps Up With The Times

By HERBERT R. SIMONDS
Vice-President, Metal Products Exhibits, Inc.
Rockefeller Center, New York

RECENT advances in nickel plating technique foreshadow important new applications in American industry. The list of developments of the past two or three years is impressive and perhaps not appreciated even by many closely associated with the plating industry. Some of the outstanding features of the rapid progress made in electro-deposition of nickel are the following:

1. The ability to deposit any desired thickness of nickel and to control the operation within exceedingly close limits.
2. Greater facility in producing a bright deposit, thus eliminating buffing on a large scale.
3. The ability to produce deposits as ductile as the steel base, making it possible to coat strip and sheet steel before, instead of after, fabrication.
4. The ability to deposit a nickel coat having a hardness value in excess of that which can be obtained by cold rolling or heat treating.
5. Close control of the plating process (the removal of rule-of-thumb methods and of secret formulae).
6. Development and perfection of automatic machinery which permits continuous quantity plating commensurate with modern mass production operations.
7. The building up of worn parts by rapid but controlled deposition of nickel.

Such far reaching advances indicate that the nickel plating industry now has gone beyond its trial period and has established itself firmly on scientific procedure. As a result, a marked increase in the consumption of nickel for plating might be expected and statistics bear this out. Some 500,000 gal. of bright nickel plating solution are in use today. The largest single installation is one of 22,000 gal. capacity in the plant of a prominent automobile manufacturer, but a still larger installation which is now in construction will have a capacity of 30,000 gal. Engineers believe that it is not impossible that the amount of nickel plating solution may be doubled within a reasonable length of time, that is, as soon as the protective value of nickel plating becomes recognized in industries other than those now using it to advantage. Such beliefs are based in large part on the increased knowledge of corrosion protection qualities of a nickel plate when applied with correct technique.

Extent of Industry

The present status of the nickel plating industry is impressive enough without the enthusiastic predictions of future progress. Authorities estimate that more than a million tons of metal, principally steel, are now nickel plated each year in this country. This bespeaks an association and interdependence between nickel and steel interests of much significance. The automo-

* Author's estimate.

bile industry, up to the present time, has not only led but has given a definite impetus to nickel plating development. As late as 1931 the amount of nickel used in the U. S. for plating was scarcely 3,000,000 lb., which compares with nearly 11,000,000 lb. in 1936 and an estimated 12,500,000 lb.* in 1937, an increase far and above that indicated by the general industrial recovery.

A graphic way to represent the extent of nickel plating at the present time is to point out that the total annual amount of plating if spread out in average nickel plate thickness would cover an automobile roadway extending from New York to Chicago.

A further idea of the extent of the industry may be had from the fact that there are more than 6500 electroplaters using nickel in the U. S. and Canada.

Corrosion Resistance

The effective resistance to corrosion of a nickel plate depends upon the clean condition of the base metal, the purity of the deposited nickel and the thickness of the plate. Recently, advances in technique have made it possible to increase the thickness at least 250 times over the thickness previously thought practical and this development alone has been responsible for focusing attention on the protective value of nickel plating as distinct from its purely decorative use. To determine more about the corrosion resistance value of nickel plating, joint research was carried on between the American Electroplaters Society and the American Bureau of Standards. Table 1 gives the comparative results of weather exposure tests for three types of atmospheres, non-industrial, industrial, and marine.

Despite the many discoveries and developments in the field of science, the protection of ferrous metals against corrosion still presents a problem of tremendous proportion. Some investigators have placed the losses throughout the world due to corrosion at several million dollars a day and conservative estimates place the annual corrosion toll in the neighborhood of a billion dollars. All of which is in addition to the millions spent each year to fight corrosion.

Zinc continues to occupy the most important position among the metals as a protection for steel even

NICKEL plating is so taken for granted today that the advance in the industry is apt to be overlooked. However it will well repay those using or producing nickel plate to follow recent developments in technique and equipment. The author of this article wrote a review of nickel plating for THE IRON AGE in 1935. Here he brings the subject up to date.

This is the fifth of a new series by Mr. Simonds which started with the issue of July 29, 1937.

though the progress of nickel in this field has been startling. However, because of its importance in the realm of appearance nickel has received too little attention for its protective value.

A committee of the Master Electroplaters Institute has prepared specifications covering the quality of nickel plate in relation to its corrosion resistance and while much of the technique described is beyond the scope of the present article a brief description of the coating based on a 48 hr. salt spray life may be in order. "The steel to be plated shall be substantially free from flaws or defects. Cleaning and preparation shall be in accordance with best practice. The use of copper as an initial or intermediate layer is optional as is also the question of bright and dull finish. The thickness of copper and nickel or of nickel alone on the undercoat shall be not less than 0.00075 in. A chromium finish shall not alter specified thickness of undercoats and the chromium shall be not less than 0.00002 in. If the final surface finish is nickel an additional nickel coat of not less than 0.0004 in. shall be deposited.

Of course in any specifications covering thickness alone some factors are omitted, and the committee has taken this into account by giving recommendations as to current

TABLE I

Weather Exposure Tests in Three Types of Atmospheres

		0.00025 In. Nickel	0.0005 In. Nickel	0.001 In. Nickel	0.002 In. Nickel
Non-industrial	State College, Pa.	31	70	87	96
	Washington, D. C.	35	82	86	94
Industrial	New York City	17	30	67	86
	Pittsburgh, Pa.	8	20	36	52
Marine	Key West, Fla.	10	25	67	79
	Sandy Hook, N. J.	10	27	62	79

The numbers (score) relate to the criterion of comparison or per cent of surface rusted as follows:

Score	Per Cent of Surface Rusted	Score	Per Cent of Surface Rusted
100	0	40	10-20
80	0-5	20	20-50
60	5-10	0	50-100

TABLE II

Corrosion of Nickel in Various Atmospheres
Report of Sub-Committee VI, Committee B-3, American Society for Testing Materials
Specimens were exposed for about 3 years at each test location

Test Location	Type of Atmosphere	Corrosion in Inches, Penetration per Year	Condition of Specimens
Pittsburgh, Pa.	Industrial	0.0014	Uniform green brown smooth film
Altoona, Pa.	Industrial	0.0016	Mottled green black slightly rough film
New York City	Industrial	0.0016	Mottled green gray tarnish
Rochester, N. Y.	Industrial	0.0003	Mottled gray-black smooth film
Sandy Hook, N. J.	Sea Coast	0.0003	Slightly mottled gray tarnish
Key West, Fla.	Sea Coast	0.00005	Cold rolled surface slightly tarnished
La Jolla, Cal.	Sea Coast	0.00003	Cold rolled surface with numerous small speckles
State College, Pa.	Rural	0.00006	Cold rolled surface slightly tarnished
Phoenix, Ariz.	Rural	0.00001	Cold rolled surface very slightly tarnished

density and time of plating. Obviously such recommendations cannot be iron-clad or universally applied as the results will depend upon the shape of the article, position of the anodes, throwing power of the solution and other similar conditions. Some of the general recommendations are as follows: "To deposit an average thickness of 0.001 in. of nickel in an acid bath with 90 per cent efficiency requires about 21 amp. hours per sq. ft. Losses in buffing may vary from 10 to 20 per cent and must be taken into account. Usually a total of 1 hour plating at 12.5 amp. per sq. ft., or 2.5 hours at 5 amp. per sq. ft. may be counted on to yield a thickness of 0.001 in. of nickel."

Physical Properties

The International Nickel Co. has found it possible to plate nickel that is nearly as soft as the annealed rolled metal. It is this ability, which any good plater has, that makes it possible to coat base metals before instead of after fabrication, a field which is rapidly growing. In the opposite direction much has been achieved in the way of a very hard nickel coating. The International Nickel Co. has produced experimentally in their laboratories electrodeposited coatings that show a hardness greater than could be achieved by heat treating.

Advantages and Disadvantages

The established value of nickel as a means of protecting steel and other metals against corrosion does not lessen the responsibility of the designing engineer in regard to its limitations. Unlike zinc which protects steel galvanically by sacrificial corrosion, if an imperfection or porous spot appears in the coating, nickel may even hasten corrosion of steel at exposed pores in the plating. Its protective value depends upon establishing a relatively thick, uniform, nonporous coating. A chromium finish protects the surface from tarnish but does not necessarily protect the steel base from corrosion. Some conclusions in a National Bureau of Standards report may be of interest in this connection. "The presence of a layer of copper reduces the protective value of thin nickel deposits under all conditions, and of thick deposits under severe conditions. If chromium is also present, the copper has very little harmful effect in thick deposits. If the copper layer is buffed, the protective value of the composite coating is increased.

"A very thin deposit of chromium, such as 0.00001 in. (0.00025 mm.), sometimes reduces the protective value, especially of pure nickel deposits. Chromium coatings about 0.00002 to 0.00003 in. (0.0005 to 0.0008 mm.) add very little to the protective value, but maintain their bright appearance owing to their resistance to tarnish. Relatively thick chromium coatings, from 0.00005 to 0. 0001 in. (0.0013 to 0.0025 mm.), improve the protection against corrosion, especially in an industrial atmosphere.

"The protective value of chromium over nickel or composite coatings is somewhat improved by using a bath with a high ratio of C_2O_2 to SO_4. Deposits produced at 95 deg. F. are slightly superior to those made at somewhat higher temperatures.

"The use of zinc under nickel makes the protective value less than that of either metal alone. Cadmium has very little effect under nickel.

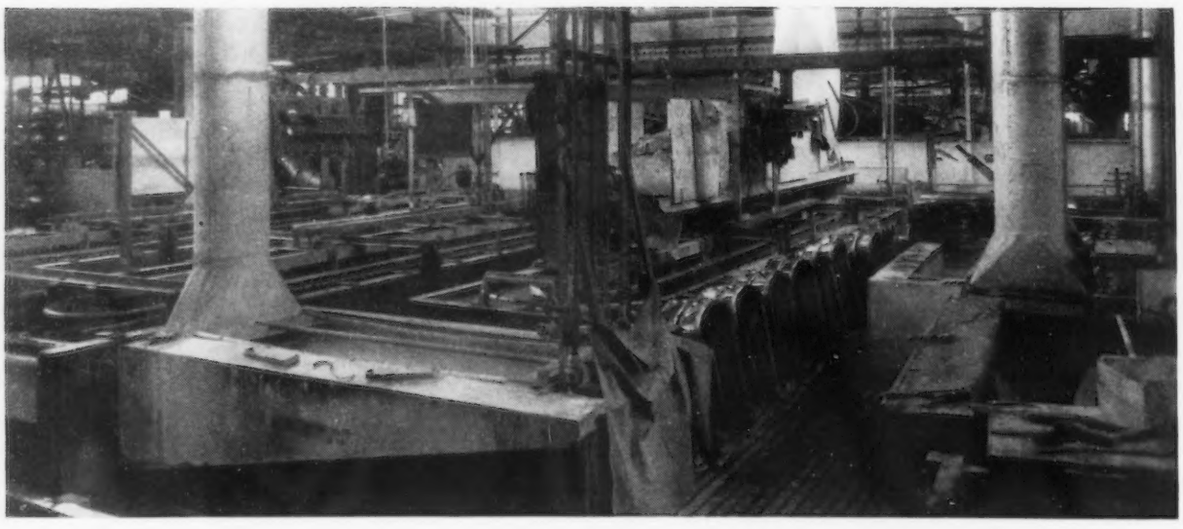
"The use of zinc or cadmium under nickel tends to produce white stains and blisters."

Determining Thickness

Various methods are in use for determining the thickness of nickel plated coatings. The microscopic method has been described in a previous series appearing in THE IRON AGE. A recently developed ingenious method known as a magnetic method is particularly appropriate for a routine plant inspection because it is a non-destructive method. Its use, however, is limited to nickel plating over a non-metallic base. The thickness of a nickel plate on such a base according to the U. S. Bureau of Standards is proportional to its magnetic attraction. Accordingly, by supporting on a delicate spring balance a small permanent magnet above a sample to be tested it is possible by proper calibration of the balance to provide direct readings of coat thickness.

Bright Nickel

Bright nickel plating has swept the industry like a storm during the past two years and unbiased engineers give this new process credit for saving of at least 25 to 50 per cent of the overall cost of nickel plating operations. Nickel deposits which come out of the bath bright instead of dull as heretofore



AT LEFT

RADIATOR shells are shown going through a semi-automatic plating process in a General Motors plant.

o o o

AT RIGHT

THIS shows a continuous automatic plating machine in operation at the plant of the Westfield Mfg. Co. The machine was made by Hanson Van Winkle-Munning Corp.

are achieved by introducing into the bath chemical additions which reduce the grain size of the deposited nickel. The bath additions usually are sulphonated acids of the aromatic series and economy comes chiefly through elimination of buffing operations preceding chromium plating. In order to achieve the brilliance desired in a chromium surface the undercoat (usually of nickel) must itself be bright and such brightness is produced either by buffing or by the use of bright nickel plating or by both. Chromium possesses important corrosion resistance properties, but its well known freedom from tarnish is responsible for its wide popularity and because nickel for many applications is the most satisfactory undercoat, nickel plating has sailed along on the same wave of popularity with chromium. The technique of bright nickel plating has vastly improved until today the method is routine practice in many plants doing chromium plating.

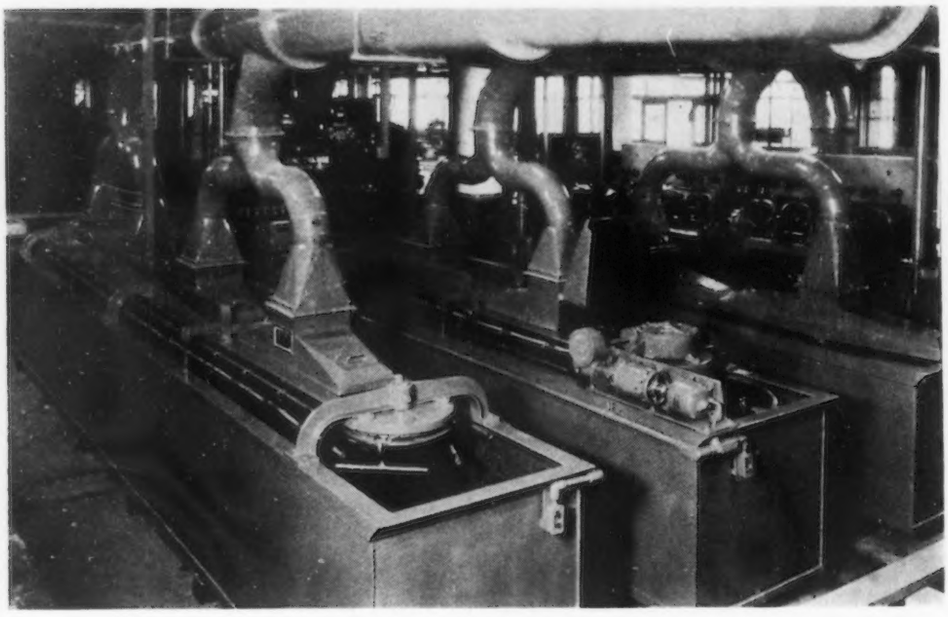
Bright nickel plating processes are sponsored in this country by several different interests, and while the original applications met with certain difficulties of control and quality, present installations are proving out on such points as:

1. Good coverage of defects in base metal
2. Ductility
3. Uniform brightness over irregular surfaces
4. Good corrosion protection
5. Partial or complete elimination of buffing before chromium plating

While the quality of bright nickel made by different processes may vary somewhat, there is no question but that the development of bright nickel deposition is one of the most valuable factors in making for plating efficiency and for the spread of the use of nickel. Part of the economy in the use of bright nickel results from the first named advantage; that of coverage of defects. It often is easier to remove a slight blemish in the base metal by use of bright nickel plating than it is by buffing. The second advantage, ductility, is a recent development. Early in the history of bright nickel the coatings were brittle and today in general they are harder than the standard dull nickel plate.

Automatic Machinery

Coincident with the advance in plating technique has gone the development of automatic plating machinery until now the finishing operations for most articles enjoy high production of a character at least commensurate with the preceding fabricating processes. When a manufacturer is dealing with small parts one of his most perplexing production problems is determining the design of handling equipment. Builders of plating machinery at first left much of the material handling to the customer. Within recent years they have recognized that handling of small parts through the sequence of cleaning and finishing processes, preliminary to a high grade plating job, was their responsibility and the result has been fully automatic units which place such processes as pickling, cleaning and plating directly in the mass production line.



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MEDIUM-SIZED products such as bumper fastenings and hardware are frequently nickel-plated with equipment of this character. Note fume exhaust ducts. Courtesy: U. S. Galvanizing & Plating Equipment Corp.

o o o

Not only have labor costs been saved by such operations but the cost of plating solutions and accessories has been reduced because the continuous movement of parts through a plating bath proves more efficient than any form of still tank plating.

Elaborate automatic units to cover the whole process of plating including pre-treatment are now in operation. Various methods are used, the most common one being that of cathode racks suspended from overhead conveyors, which conveyors raise and lower the racks as they travel in and out of the succession of tanks. Another type of handling which has come into use in Europe is the hydraulic lift which rotates arms from one station to the next in such a manner as to allow variation of time at certain stations. This enables adjustment of the plating time without changing the time of cleaning or other operations in the sequence.

The mechanical handling of strip continuously through a succession of baths by means of rollers is another mass production method now being used. The continuous separation of certain types of electroformed material from a drum rotating in a plating bath is still another method. In the general design of equipment ingenious construction has speeded up out-of-tank travel to obviate risk of drying off or tarnishing and of course to speed production and considerably increase efficiency. Automatic machinery for electroplating was introduced some twenty years ago, but for several reasons, principal of which was reluctance of manufacturers to include finishing in their established lines of production, it did not take. Only recently has better cooperation between machinery manufacturer and metal parts fabricator resulted in acceptance of finishing as an integral part of the production sequence.

"Never before in the history of electroplating has there been such a demand for automatic equipment," state engineers of the Hanson-Van Winkle-Munning Co., who add, "We and other similar equipment manufacturers are finding it difficult to meet the requests of the surprising variety of companies throughout the country who are now anxious to install automatic plating machinery much of which, of necessity, calls for individual design and special construction."

Economies Effected

Some recent installations of fully automatic machinery have effected a 60 per cent decrease of idle time. In other words, the turnover of material has been more than doubled.

The conveyor principle as applied to plating is used in three designs of equipment:

1. The return type which unloads and loads the work at approximately the same location and same time.
2. The straight line type which provides a continuous flow from a loading station at one end to an unloading station at the other.
3. The dwell type which also unloads and loads at opposite ends, but which instead of carrying the work at a continuous flow process permits it to stand still for predetermined periods in each tank in the sequence.

Both of the first two types carry the work at a constant speed through the various baths. The advantages claimed for these types are quicker production, less solution per lb. of work plated, and more uniform results. The third type has a lower first cost and is well adapted to special conditions and to varying products. All three types are used for electrolytic cleaning and similar processes as well as for plating.

Barrel Plating

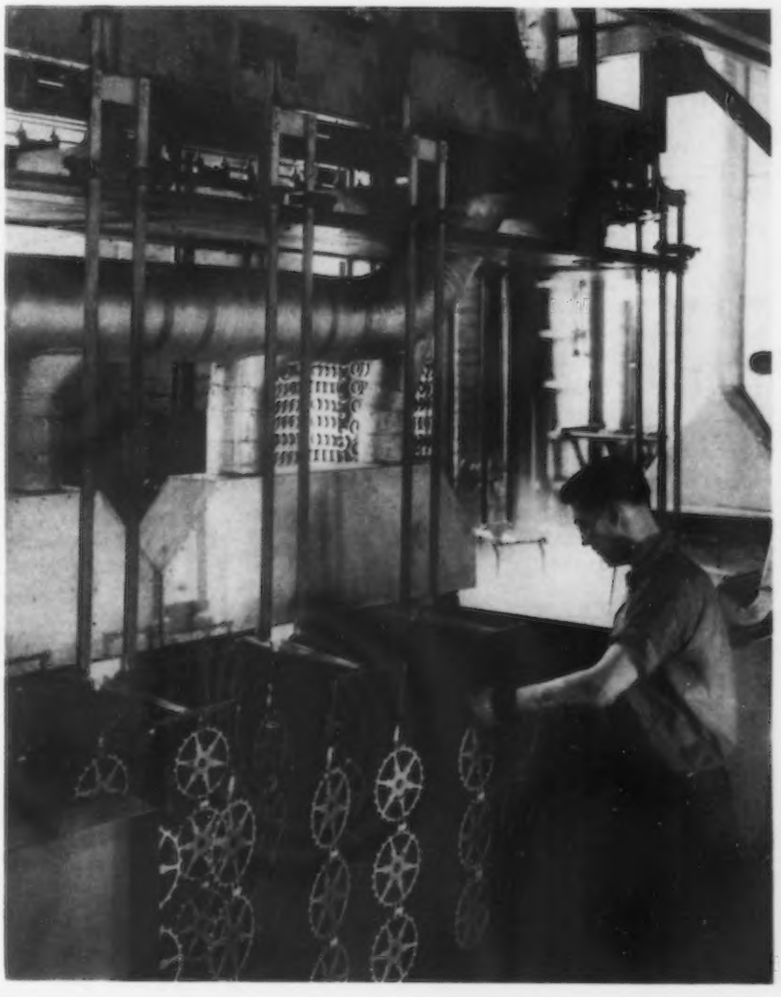
The design of plating and finishing equipment is controlled by the character of work in production. Where conditions are right the rotating barrel forms the simplest and most efficient process. A modification of the barrel is the drum which, loaded at one end and discharged at the other, becomes a link in continuous operation. In the finishing of small parts barrel cleaning is common even where plating is done by straight line system. However, a recent trend is toward the use of barrels for plating as well. For many small parts

barrels are entirely satisfactory, have less initial expense and are cheaper to operate. Parts to be barrel plated must of course withstand the action of constant tumbling against the mass of the other parts in the barrel. Sometimes barrel plating is used for an undercoat followed either by burnishing or buffing and subsequently by application of a finish plate. An excellent example of a product well suited to barrel plating is the ring which holds letters in place on typewriter keys. Quantities of such rings are now suitably plated in barrels with an average time of 20 minutes for the plating of each barrel charge. As an example of the difference in time required to plate different parts, the carriage levers on typewriters require two hours per charge on barrel plating. The principal automobile companies, typewriter companies and business machine manufacturers are all extensive users of barrel plating processes. Chromium plating in barrels has been a possibility for 3 or 4 years but it is still in a semi-experimental stage. Several companies which are regularly applying satisfactory chromium plates by barrel find that the relatively high percentage of rejects and the additional expense for inspection tend to offset the advantages. Nevertheless, barrel plating is bound to increase because of its basic economies.

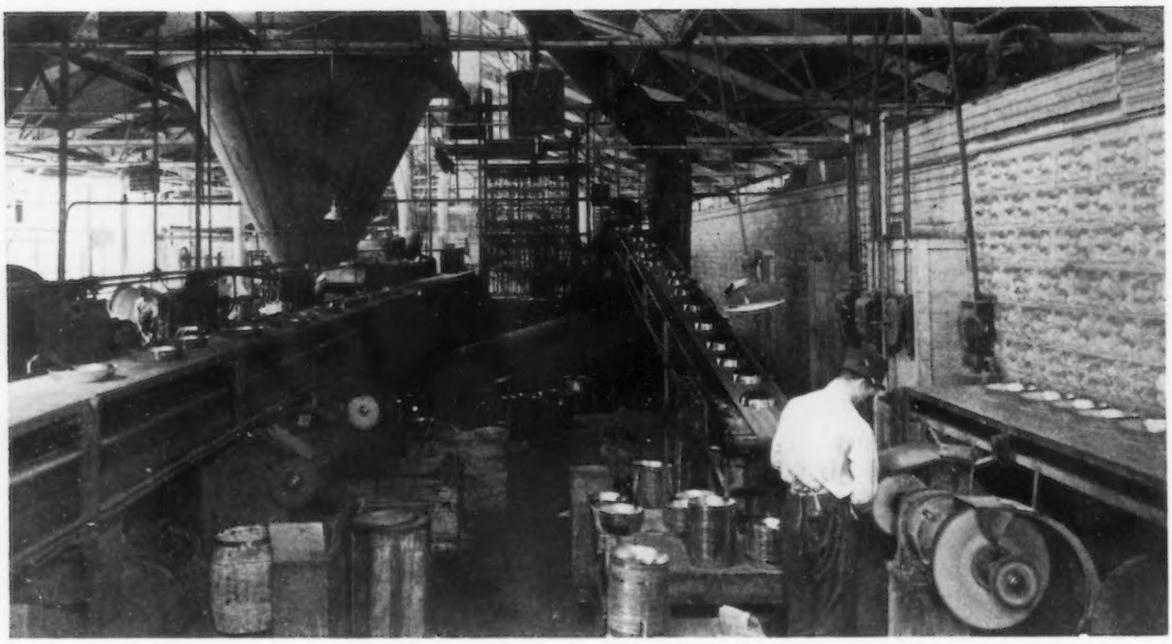
Salvaging Worn Parts

The ability to apply heavy nickel coatings rapidly and at relatively low cost has turned attention of engineers to this method of building up worn parts. Throughout industry there are innumerable cases in which the wear of moving parts necessitates periodical replacement or repair. Where the part is large and expensive as in the case of crossbars on locomotives, there is marked economy in building up the worn surface by some means and then grinding down to the original dimension. Often such a part is built up with the welding rod by a lay-on process. However, in some cases a build-up with a nickel plate has certain advantages. This method is used to a considerable extent in England and is beginning to take hold here. It is done by first cleaning the part to be repaired and then dipping it in a tank of molten, low-melting-point wax. This covers the entire surface of the part with a thin insulating film. Afterward, the area which is to be built up is scraped to remove the wax and the surface underneath is cleaned in an electrolytic bath which removes foreign matter and traces of oxides. The part is then immersed in a plating bath and a heavy coat is deposited at very high current density. Plating is done at 80 deg. F. in still tanks and parts weighing as much as two tons have been repaired in this manner with the thickness of the built-up part ranging from a few thousandths of an inch to a quarter of an inch or more.

After plating the wax is removed from the part by steam or hot water and the built-up area is then ground or machined to size. Frequently shafts or other round parts are turned down to size on lathes. In such case high speed steel tools should be used for cutting the nickel plate. These are set from 1/64 in. to 1/32 in. below center with cutting angle at 70 deg. and clearance of 10 deg. The cut should preferably begin at the center of the work for safer handling of the natural overgrowth of the deposited metal. A soluble oil lubricant helps. Shaping or planing of these built-up nickel sections is not advised due to the effect on the edges. Milling is possible and grinding is always safe. With careful cleaning it is claimed that parts built up in this manner compare favorably with the original construction. The bond except at the edges has the tensile strength of the metals themselves. Many tests on crank shafts, valve spindles, im-



THIS shows the loading stage of a continuous nickel plating machine used for bicycle sprockets.



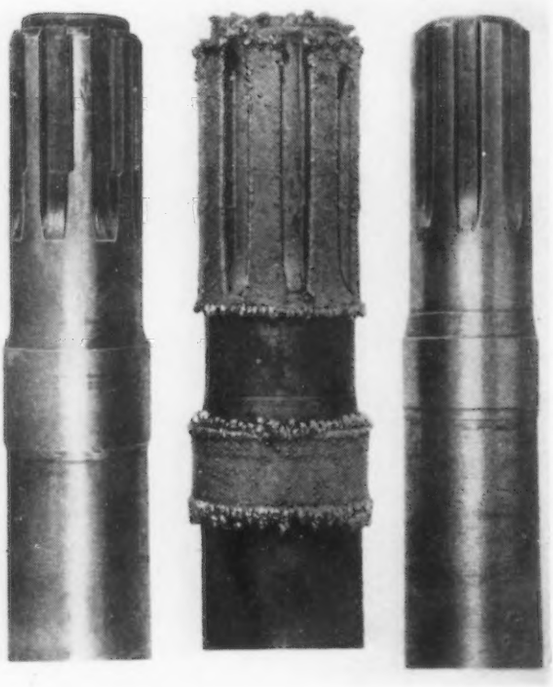
peller shafts, pump shafts, airplane propeller splines, and similar parts have shown that the wear resistance of the nickel deposits is as good or better than that of the underlying original metal.

Prefinish in Nickel

The previously mentioned ability to deposit either soft, ductile, or very hard nickel plates has stimulated the already significant trend toward prefinishing sheet and strip metal. Almost every month sees the extension of this process into new fields. One important company on the production end of the prefinishing art is the American Nickeloid Co. and companies on the consumption end include automobile manufacturers, makers of cosmetic containers, or luggage hardware, of lighting fixtures and the growing list of bicycle fabricators.

The American Nickeloid Co. makes flat sheets, coiled strip, and round edge flat wire with a pure nickel coating guaranteed not to lift, chip or peel during ordinary processing operations. Fabricators are able to shear, blank, stamp, form and solder these metals without injury to the polished surfaces, thus eliminating the necessity and expense of attempting to hand polish and plate individual articles. An example is the small metal clip so familiar to everyone on tubes of tooth paste and shaving cream. Here a small clip of bright, nickel-coated zinc seals the flat bottom part of the tube. This is produced on automatic machinery from the finished metal supplied to the manufacturer in 250 foot coils. Prefinished material is in common use as covering for utility kitchen tables, shelves, or around the kitchen sink to keep the walls from being spotted. It is supplied in large, flat sheets. Stock sizes vary in thickness from 0.006 to 0.0625 in.

Standard prefinished materials include nickel coated tin plate, prenickeled steel, brass and copper sheets and strip. To prevent scratching or finger printing in handling these prefinished materials they are finished with paper adhered. A special adhesive is used, making it possible to remove paper easily after fabrication, leaving a bright, lustrous finished product.



ABOVE

HANDLING equipment is important in the finishing of small parts. This shows skillets travelling between operations at the Eaton Detroit Metal Co. plant.

o o o

AT LEFT

THREE views of a spline shaft: the worn shaft, after being built up with nickel, finally machined and finished. Center photo is slightly enlarged.

Open-Hearth Practices in a Steel Castings Plant*

By JOHN W. PORTER

Assistant Works Manager, American Steel Foundries, Granite City, Ill.

THE first open-hearth steel melting furnaces for the foundry were characterized by improper design, insufficient steel binding, lack of steel jacketing and insulation, poor and unsuited refractories, and required the invention and application of appropriate control through which operating data could be obtained and applied for systematizing the procedure to be followed by a better selected and more educated operating personnel. The operations carried on in that period were further branded with long working days and general inefficiency of both man and equipment.

In the intervening years great improvements have been made in the general technique followed in the production of open-hearth heats. This technique has been developed through the modification of furnace design and through the use of devices for accurately determining the existing conditions during the melting and refining periods.

Typical improvements in more or less common use today are: (1) Insulation of furnace walls and roof; (2) steel jacketing of walls; (3) use of indicating and recording pyrometers to show the temperature of checker chambers, of the roof and of the gases in the flues and at base of stack; (4) use of optical pyrometers to determine the temperature of the slag blanket before tapping and of the metal as it either flows into the ladle or into the molds; (5) use of an indicator of a checker pyrometer to actuate signal to operator for reversing the flow of gases in the furnace or to actually work an automatic reversing mechanism; (6) maintaining of a predetermined furnace pressure or draft; (7) provision for adjusting the fuel and air valves, so that the proper ratio for combustion is maintained regardless of the rate at which the fuel is required; (8) maintaining of the rate of fuel input constant at the amount required at the several stages of making the heat; (9) the use of automatically controlled fuel preheaters to maintain constant temperature fuel; (10) the use of water-cooled doors, jambs, burner ports, and furnace fronts; (11) the production and application of better and more uniform refractories obtained through the research and development of the refractory manufacturers; (12) the use of recording instruments to permit of the supervisor being able to thoroughly check the detailed working of every heat; and (13) the ability of the supervisor to definitely instruct as to the procedure to be followed in every case. In addition to the mechanical devices heretofore listed, the routine of production is further standardized by providing furnace charges in definite quantities and composition of the several items charged. This necessitates the full cooperation of the chemical and yard departments.

The following details pertain to the current basic open-hearth steel refining practices in use at the Granite City Works of the American Steel Foundries for the production of steel for castings:

The first basic open-hearth heat as produced at the Granite City Works was in 1894. Subsequently, six 25-ton furnaces were built and employed till 1931, when the cumu-

* Paper presented at the foundry conference sponsored by the American Foundrymen's Association, the St. Louis Chapter of the A.F.A., and the Missouri School of Mines, at Rollo, Mo. Oct. 8.

lative improvements in open-hearth practice dictated complete rearrangement of that department.

There are three basic furnaces in use at the present time, into each of which 30 tons is generally charged and refined. The furnaces are known as the Stevens type and are encased with steel plate on the outside, with the exception of the roof. Between the plate and the brickwork, insulation is used.

Bottom Preparation

Assuming the furnace is complete mechanically and structurally, a small wood fire is started in the stack and in front of each furnace door, with the reversing valves set in the center to pull both ways to the stack. Care must be taken that the flames do not come in contact with the walls or the roof of the furnace.

As the furnace dries out, the fire is built up to cover the furnace bottom and continued about 72 hr. Fuel oil must not be turned on until the walls begin to show a reddish color. At the time fuel oil is turned on the furnace, the consumption should be held as low as possible, with a maximum consumption of 50 gal. per hr.

Care must be taken that the furnace bottom is clean when the fuel oil is turned on. When the fuel oil is turned on the furnace, the reversing valves are taken off center, and the furnace is reversed after one hour. The time of reversals is gradually cut down until at the end of about 48 hr. the time of reversals is 15 min. It is important that the temperature of the furnace be increased gradually, with a minimum of 48 hr. to bring the furnace to working temperature, after which the work of building the bottom can be started.

Furnace Bottom

Double-burned magnesite is employed for all new furnace bottoms, being used because it is generally purer than dolomite and has a higher melting point; furthermore, it does not slack as quickly if the furnace is not operated for a period. The magnesite is mixed with ground basic slag in the proportion of three parts magnesite and one part slag. This mixture will be referred to as magnesite mix.

It is important to select slag free from steel and ground as fine or finer than the double burned magnesite. No other bonds of any nature are used with these materials.

A coating of slag is placed on the brickwork before any magnesite mix is used. The material should be spread over the furnace bottom as evenly as possible with layers not over ¼ in. thick, and sufficient time allowed for the material to properly sinter before the next layer is placed in the furnace. For the first 3 in. of bottom placed in the furnace, an interval of not less than 2¼ hr. should elapse before the next layer is placed in the furnace. After the bottom is 3 in. thick, tests are made at least three times in 24 hr., by shutting off the fuel oil, allowing the bottom to cool for 30 min., and striking the bottom with the end of a rod to test the solidity of the material in place.

Bottoms

After the bottom has been built up, until it is about 3 in. thick, about 12 samples of the bottom are obtained in 24 hr. by a rod properly equipped. After cooling, these samples are broken and the fractures examined for solidity.

The mixture of three-fourths magnesite and one-fourth slag is used on side walls exclusively. Some slag will flow out of the mixture to the furnace bottom. Magnesite without slag is used to fill in the furnace bottom and absorb this excess slag. The proportion of slag in the mixture should be adjusted to produce a solid bottom.

The practice of taking samples is continued until the bottom is complete, the layers of magnesite mix are continued until the level of the tapping hole is reached, and the time necessary to build a bottom in a 30-ton basic open hearth is about six days.

A pipe 6 in. in diameter and of the correct length is placed in the proper position for the tapping hole and held in place by blocking where the tapping hole passes through the wall of the furnace. The part of the pipe inside the wall of the furnace is covered with a layer of magnesite mix one inch thick, and the end which extends inside the furnace bottom line is covered with magnesite mix to prevent the pipe melting. The pipe is closed by filling the inside with either magnesite or burned dolomite, as though it were closed for a heat.

The layers of magnesite mix are continued up the side of the furnace to a point about 10 in. above the slag line. The furnace bottom must be arranged so that the steel and slag will all drain out of the furnace when the tap hole is opened.

On the tapping hole where the pipe was blocked in the furnace wall to keep it in position, the brick used for blocking is removed and replaced with a mixture of three parts of ganister or chrome and one part of clay, with enough water to make the mixture pack well. This mixture is rammed as hard as possible, and the space between the tapping hole casting and the pipe in the wall of the furnace is completely filled. The tapping hole is cleaned out and reclosed as though a heat were to be charged.

Ground slag is charged into the furnace, placing this as high as possible on the sides of the furnace, using the same methods used to place material for the bottom. This is repeated after approximately one hour and continued until there is a depth of 2 to 6 in. of liquid slag on the furnace bottom. The liquid slag is splashed as high as possible on the walls and ends of the furnace to allow the magnesite to absorb as much as possible of this liquid slag. The time allowed for this slagging bottom should not be less than 5 hr.

The slag is then tapped and the furnace is ready for the first heat. Before charging the furnace, the furnace bottom is chilled by opening the doors and cutting off the fuel. Note that the time used for chilling the furnace must be left to the judgment of the melters.

Tapping Hole

The tapping hole is closed by holding a rabble against the end in the furnace. Bottom material is inserted from the outside and firmly packed in place until the tap hole is filled to about 6 in. from the end. This space is filled with loam moistened with sufficient moisture to make it pack well.

The rabble is removed from the inside of the tap hole and some bottom material placed over the end of the tap hole by shoveling through the door of the furnace.

Furnace Runner

The furnace runner is lined with clay brick and then mudded with loam moistened with water to the

ECONOMICAL ladle metal of correct analysis is entirely dependent upon the melting and refining practices which have gone before. If the melting unit is an open hearth, it is particularly important that the operator have full knowledge of correct furnace construction and design, the use of modern control instruments and appropriate refractories, and a systematized charging and melting cycle. All these significant points are described in this article, which lists in detail the operation of basic open hearths of American Steel Foundries, at Granite City, Ill.

proper consistency so that it packs well. This mud is renewed after each heat. The runner is dried to remove all moisture before the heat is tapped. In making up the furnace charge, consideration should be given to the material on hand, chemical analysis, price, and space required in the furnace. In arranging the furnace charge the standard shown in Table I is sought.

TABLE I

Furnace Charge, Analyses and Weights

	Analyses, Per Cent	
	As Charged	As Melted
Carbon	1.75 to 2.0	0.65 to 0.75
Manganese	1.40 to 1.50	.....
Silicon	0.50 max.	0.03
Sulphur	0.045 max.	?
Phosphorus	0.065 max.	?

	Typical Charge	
	Weight in Lb.	Per Cent of Total
Pig iron	12,000	20.0
Company scrap	6,000	10.0
Plate scrap	22,500	37.5
Rails	11,000	18.5
Forgings	4,500	7.5
Springs	4,000	6.5
Total	60,000	100.0
Tar Coke		300 lb.
Burned Lime		2600 lb.
Manganese Ore		600 lb.

Burned lime is used in place of limestone for two reasons (1) the time element in melting, and (2) the need for less initial carbon content in charge. Additional lime may be added to the bath when neccesary to condition the slag.

Charging

The material should be charged in the following order: (1) Scrap, (2) petroleum coke and manganese ore, (3) lime, (4) scrap, except rails, (5) rails, and (6) pig iron.

The first material charged into the furnace on each heat should be selected with a purpose of covering the bottom of the furnace and furnishing a bed for the lime, thus preventing the lime from sticking to the furnace bottom. Plate scrap is probably the best for this purpose. Lime should be spread as evenly as possible over the first scrap charged.

Draft

The furnace should be arranged with two sources of draft, a fan to force air into the furnace and a stack to draw air out of the furnace. The amount of air admitted to the furnace is controlled by the diaphragm, which also controls the fuel oil. The stack is provided with a damper and manometer, so that the proper conditions and balanced pressure can be maintained in the furnace.

The draft in the furnace at the downtakes should be about 0.07 in. on the outgoing end, and about 0.05 in. on the incoming end. It is necessary to have a slight plus pressure in the furnace to avoid cold air entering the furnace. When the final additions are made, the draft is reduced to 0.04 in. in the stack.

The fuel oil and steam are cut down at the same time. This condition is maintained until the heat is tapped. A reduction of draft, fuel oil and steam at the time of making the final additions is recommended, because this condition cuts down the amount of oxidation of the metal and consequently less loss of manganese and carbon, and of chromium when used.

Fuel Oil

Fuel oil of a gravity of 5 to 12 deg. Baumé is used, at a temperature of 170 to 190 deg. F. when it enters the furnace. A preheater is used for the oil before it enters the burner. The amount of fuel oil being burned per hour is indicated and recorded. The amount of fuel oil necessary cannot be definitely stated, but can be determined by experience for each furnace and, after being determined, should be followed closely. One hundred and twenty to 130 gal. per hr. after charging is the average consumption.

The fuel oil rate of flow is reduced when the heat is melted, and the melter must exercise his own judgment on this question. On

heats which melt very hot, the consumption of fuel oil may be cut down as low as 80 to 90 gal. per hr. when the final additions are made.

Steam

The use of superheated steam for atomizing the fuel oil gives assurance of dry steam. The temperature of the superheated steam at the regulator should be 600 to 700 deg. F. The pressure should be 55 to 60 lb. at the regulator. This is maintained until the heat is melted, and when melted the steam pressure is adjusted to the conditions in the furnace, depending on the judgment of the melter in charge. When the final additions are made, the steam pressure is reduced and a soft rolling flame is held until the heat is tapped.

Slag

The furnace charge should contain sufficient lime to remove the impurities in the metal and furnish protection to the metal from an oxidizing flame. Whenever it is necessary to use fluorspar to condition the slag, the amount should be held to a minimum.

Refining

During charging and until the lime starts to come up, the furnace should be run with a full flame, predetermined settings being maintained by the instruments. The temperature of the bath at the time the charge is melted should be high enough to gradually cut down the fuel oil, air and steam, and by this practice some manganese and chromium reverts to the steel from the slag.

As soon as the heat is melted and the lime is up, which is indicated by the absence of localized violent boiling action in the bath, a spoon test of the metal should be taken, the melter judging the carbon content by the size of the crystals in the fracture. Upon the carbon content the melter bases his judgment as to the amount of iron ore to add, and also to the time it is to be used. The heat should be at a fairly high temperature and the slag should be in a mushy condition.

After the iron ore addition, the bath will break into a brisk boiling action, which should gradually slow down to a uniform gentle boiling action over its entire surface, the boiling action becoming less intense and the carbon drop less rapid as the bath approaches a carbon content of 0.25. During this time the amount of fuel, air and draft should be gradually diminished but still keeping a plus pressure. The slag should be assuming a creamy condition.

Iron ore should not be used until the slag is in a mushy condition.

Preliminary Tests

Tests are taken by first slagging the spoon thoroughly, then thrusting it down into the steel, withdrawing it and pouring the steel into a test mold. The test should be cooled slowly and all tests given approximately the same treatment, or variations in the results of the analysis may be expected when the laboratory uses the color method of analysis.

On the first preliminary test the chemical laboratory determines the carbon, manganese, sulphur and, on chrome heats, chromium. On all subsequent tests the chemical laboratory determines the carbon and manganese.

Other tests are taken as the refinement of the metal proceeds.

Additions for Certain Heats

Ferrosilicon, 15 per cent, should be added to the bath 10 min. before tapping. Ferromanganese, 80 per cent is usually divided. Ground 80 per cent ferromanganese is added through a chute over the furnace runner, usually 100 lb. per heat when this quantity is available; the balance should be added to the bath 3 min. before tapping. Where no fines are available, it is satisfactory to use lump 80 per cent ferromanganese through the furnace.

The quantity of 80 per cent ferromanganese charged should be adjusted, the amount used depending on the residual manganese in the bath as shown by the preliminary tests. The ferromanganese charged in the furnace should be moistened to assist it in passing through the slag, and if any lumps should hang in the slag it is satisfactory to push them through with a rod. The ferromanganese added in the chute should be broken into pieces that will go through a ½-in. screen.

All of the 50 per cent ferrosilicon should be added through a chute over the furnace runner. The material should be broken into pieces that will pass through a ½-in. screen.

Finishing and Tapping

When the final additions are made, the draft is cut down. The amount of fuel oil burned and steam used for atomizing is reduced as much as possible, and this condition is maintained until the heat is tapped.

The material used to close the tap hole should be removed from the outside, leaving only a few inches of material on the inside. The tap hole and the runner should be thoroughly cleaned before proceeding. A tapping rod should then be inserted through the observation hole in the center door of the furnace, slagged, and after locating the tapping hole, the rod is thrust endwise against the material left in the tap hole until the rod pushes through and allows the heat to run out of the tap hole into the ladle.

Ladle Additions

When the metal in the ladle is approximately 1 ft. deep, the bottom of the chute over the runner is opened, allowing the material in the chute to run into the stream of metal as it runs from the furnace into the ladle.

The chemist's report of the carbon and the manganese in the final preliminary test is usually received too late to make adjustments of the addition charged into the furnace. The adjustments required are, therefore, made in the materials charged in the chute over the furnace runner.

Bottom Repairs

Furnace bottom should be maintained in good condition. This can be accomplished by proper care. After a heat is tapped, the furnace bottom should be free from pools of slag or steel. When the bottom becomes uneven, due to lime adhering to it or due to portions of the bottom materials becoming loosened by the action of the bath, the pools should be splashed or rabbled out so that the slag or steel will drain out at the tap hole.

When a large or deep hole occurs in the bottom, care should be taken to rabble it out clean, then dry it up with bottom materials. After drying, the hole is to be filled with bottom material, each addition being sintered until the

(CONTINUED ON PAGE 96)

Recent Progress in Industrial Radiography

By HERBERT R. ISENBURGER

President, St. John X-Ray Service, Inc.

SINCE the writer's exposure charts were published in 1934[1], much progress has been made in radiographic technique, especially in the construction of more efficient X-ray equipment. The most important factor in this development was the expiration of the Coolidge patent in 1933, which eliminated the monopoly of tube manufacture in this country. For a good many years tubes with line-focus construction were available in Europe[2], and some of these were specially designed for industrial radiography where a fine focal spot is of great advantage. This type of water-cooled tube, used with a double Villard circuit[3], 30-ft. shock-proof cables and operating at a peak of 220 kv. and 10 ma., is now being used by the St. John X-ray Service.

Besides the advantage of the line-focus, the tube has a special electron grid which filters the radiation and at the same time practically doubles the penetrating effect. In these tubes X-rays are generated near the vicinity of the crest of the tension curve and, therefore, the X-ray output with pulsating potential circuits is almost as large as on constant potential, but the half value layer is larger than that obtained with tubes of conventional design operated on pulsating potential. Fig. 1 illustrates the principle of grid action. A small transformer and a condenser are used to obtain a pulsating potential which, with respect to the cathode of the X-ray tube, is positive only when the tension across the tube is at its maximum. In Fig. 1 note that e_g = grid potential, t_A = tube tension, and i = tube current. As long as the potential of the grid is negative with respect to the cathode, electrons cannot pass from the cathode to the anode since the negatively charged potential repels them. When the grid is positive with respect to the cathode, the grid will not only allow passage of electrons but will favor it. Fig. 2 shows the circuit diagram of the grid unit which is housed in the cable end-spheres of ray and shock-proof tubes.

While the compact design and the practically point-source of radiation of this tube make it possible to work at close distance, this feature, at the same time, limits the area of exposure. The focus-film distance should be about twice as great as the portion of the object under investigation. In order to obtain the best results possible, the film should be as close to the object as possible. The image of a defect is enlarged by the square of the distance between it and the film. That this tends to increase rapidly with increased distance is obvious. This is one of the reasons why a 2 per cent defect which is artificially located at the inside of an object (closer to the film) cannot be detected, whereas the 2 per cent marker placed on the tube side does show up.

This raises the penetrameter question. It is true that seven years ago when the first X-ray requirements for the A.S.M.E. Boiler Code[4] were worked out, it was desirable to have a means to check correct exposure technique. This means has served its purpose well, but it is time now to change to something more definite. When the efforts made in recent revisions of the code[5] and other investigations are examined,[6]

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[1] Transactions, American Society Metals, 23 (1935), pp. 614-20.

[2] H. R. Isenburger, "X-rays and X-ray Inspection in Piping," Heating Piping & Air Conditioning, Vol. 1 (1929), pp. 115-20.

[3] St. John and Isenburger, "Industrial Radiography," 1934, John Wiley & Sons, New York, p. 64.

[4] Ancel St. John, "X-ray Inspection of Welds in Pressure Vessels," THE IRON AGE, Vol. 126 (1930), pp. 1828-32.

[5] A.S.M.E. Code for Unfired Pressure Vessels, U-68, Addenda 1934, pp. 116-18.

[6] E. A. W. Mueller, "Zweckmaess'ge Aufnahmebedingungen bei der Roe.tgendurchstrahlung," Arch. f.d. Eisenhuettenwesen, Vol. 10 (1936/37), No. 6, pp. 267-73.

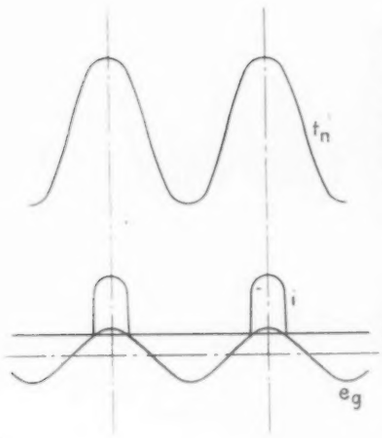

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FIG. 1 — Principle of grid action. A pulsating potential which, with respect to the cathode of the X-ray tube, is positive only when the tension across the tube is at its maximum.

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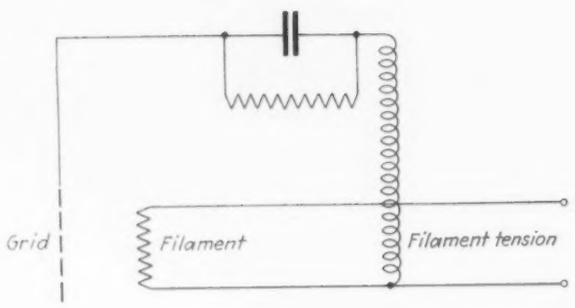
FIG. 2 — Circuit diagram of the grid unit which is housed in the cable end-spheres of ray and shock - proof tubes.



it is realized that the 2 per cent marker has played out its role. The up-to-date radiologist who is engaged in industrial work knows how to use the proper technique—in fact he objects to any doubt as to his ability. His work is hard enough and should not be complicated by unnecessary procedures, such as the present boiler code requirements, which may be misleading anyway. What is desirable, however, is a systematic study of intensity measurements under various conditions. For this the author proposes a penetrameter previously described. This is an indicator for contrast (depth of holes) as well as definition (size of holes). Placed at the inside of a test specimen, actual exposure conditions are approximated more closely than by placing the penetrameter on any one side of the object.

It was stated that the exposure conditions should be eased as much as possible for routine work. It is, therefore, a prime requirement to have simple exposure charts for quick reference. Such charts are reproduced in Fig. 3. They have been established at a 16-in. focus-film distance. Correct exposure times for greater or smaller distances can be found by multiplying the 16-in. distance time by the amount of minutes found opposite the distance figure on the scale at the left-hand side of the charts. The basic steel density was taken as 7.6 grams per sq. cm., and the average film density to be 0.7.

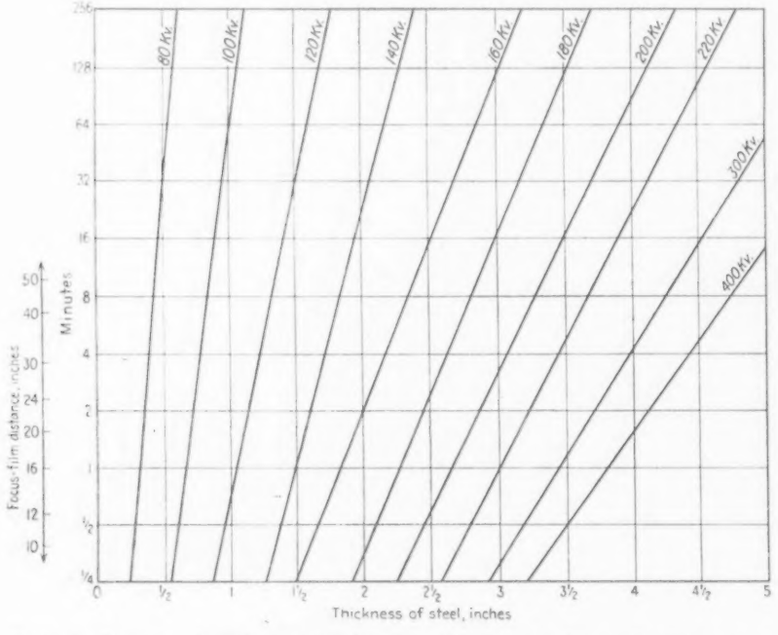


FIG. 3—Exposure chart for quick reference. This chart is for steel, with a 16-in. focus-film distance. The film density is 0.7 and the steel density is 7.6.

For more accurate determination, of course, it is necessary to take into consideration the actual density of the material under investigation in order to determine the exposure factor, and the length of the area under exposure.[6] This does not make a great difference on thicknesses below two inches of steel, but above three inches it is quite important and should be observed carefully. At the latter thickness and above it some filters should be employed in order to absorb undesirable scattering coming from the steel itself. Very thin filters of high-atomic weight materials have been developed, and these should be placed between the object and the film. They vary for the different thicknesses of metal and necessitate an increase in exposure time from 25 per cent at 3¼ in. to 75 per cent at 4¼ in. of steel. The definition can thus be doubled, i.e., a 2 per cent marker can be detected in 4-in. steel with filter whereas about 4 per cent is the observable limit without it. It is obvious that the use of these filters which are incorporated in the film cassette is ever so much simpler than a movable Bucky diaphragm which in addition to being cumbersome to use requires about twice the increase in exposure time than when using filters.

Due to the well-known Compton effect[8] the scattering of X-rays from voltages above approximately 220 kv. becomes so great that exposures are practically unsuited. Therefore, it is not considered that the X-ray wave-range between 220 kv. to 650

[7] A. S. T. M., "X-ray Symposium," 1937, pp. 22-23.

[8] Metal Progress, October, 1937, p. 498. Physical Review, Vol. 19 (1922), pp. 267-68; National Research Council Bulletin, Vol. 4, Part 2 (1922).

AT RIGHT

FIG. 4—A portable X-ray unit mounted on a trailer chassis.

o o o

BELOW

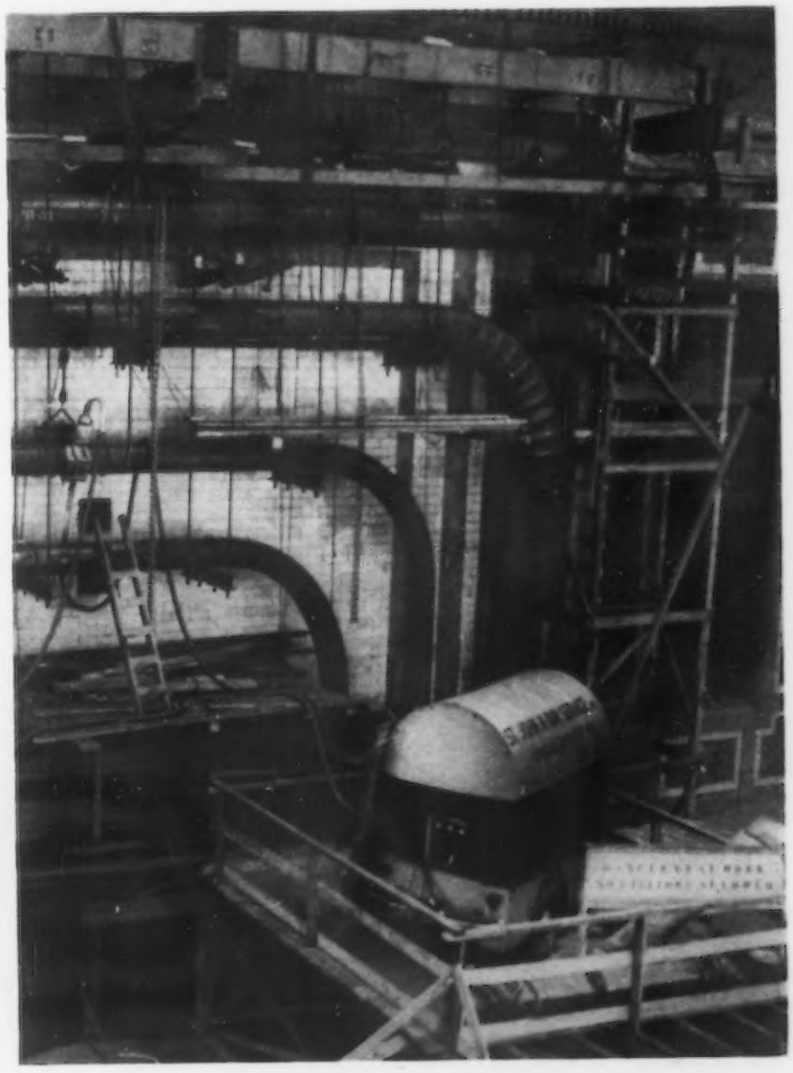
FIG. 5—The unit on the job, taking a picture of a welded joint in a high-pressure pipe, with cover used as darkroom.

kv. is acceptable for our work. Above 650 kv. we are within the gamma-ray zone. Therefore, it is contended that the latter should be used where X-rays, excited by 220 kv., cease to do the job.

A word may be said about intensifying screens. The use of these screens is very important. A differentiation between two kinds of screens is made: (1) Detail and (2) speed screens. Detail screens are suitable for low-voltage work on thicknesses below one inch of steel, whereas above that thickness high-speed or industrial screens should be employed. Screens vary in quality and should be carefully selected. The charts in Fig. 3 are based on a combination of special screens with blue base safety X-ray film. It is well to store X-ray film for about three months before using it since fresh film is slower than aged film.

The new developments in equipment as well as experience just described have helped progress in industrial radiography in general and the field inspection work in particular. With the aid of the new ray and shock-proof tubes, shock-proof cables and specially designed generating equipment, a compact and rigidly built portable unit on a trailer chassis has been developed. This machine is depicted in transit in Fig. 4 and on the job in Fig. 5. A small car is able to pull it around with ease. The trailer cover can be used as a darkroom in the field. The transformer is a single tank affair with water pump and control board mounted permanently to the chassis. The complete unit weighs about 3000 lb. and is capable of penetrating three inches of steel in one minute. Fig. 5 shows the tube set up for the inspection of a welded joint in high-pressure piping.[9] Other important applications hitherto neglected on account of unsuitable equipment are the examination of airplanes, ships, welded bridge and building structures, large castings, and the like.

The importance and advantages of X-ray inspection are being slowly recognized by industry, and as the requirements increase new developments will emerge. The field is still young and the possibilities unlimited. Experience and continued practice will further the art. The radiologist does not yet know all the many varied problems in industries which X-rays may be able to solve. They have to be explored jointly by the manufacturer of the product and the inspector who knows how to apply his tool successfully.



[9] Mechanical Engineering, November, 1937, pp. 809-812.

Putting Industrial Trucks Through

THE past two or three years have seen some radical advances in the development of industrial trucks as all-round, self-contained mechanical handling units. Originally their function was that of *shifting* loads; that is, moving burdens horizontally only. The equipment developed for this purpose could not be said to be "self-contained" from the handling point of view, for it was always necessary to load them either by hand, or by the aid of other mechanical handling devices adapted to pick up materials, parts or packages and deposit them on the platform of the truck.

Then cranes and other hoisting mechanisms were added as integral parts of the trucks; the platform lift idea came into being and was rapidly extended to the use of forks, rams and cradles; and finally a host of various and unusual combinations of supplementary equipment came like a flood to make the industrial truck (and at times its tractor brother) a unit which, without the aid of outside apparatus, would pick up almost any size and shape of load from almost every conceivable position, move it to a new location and discharge it to floor level, to proper machine working heights, or to stacked tiers, as required.

Today, then, the industrial truck has largely graduated from its former estate of *shifting* equipment to an estate of comprehensive usefulness in the combined realms of *lifting*, *shifting* and *placing*. With all this development it has preserved a unique *flexibility* of movement, and has continually increased its effective *range* of action, fulfilling a role in the materials handling field which cannot be matched by any other type of mechanical handling equipment. In previous articles ("Self-Powered Mobile Handling Equipment," Feb. 18, 1937, and "The Flexibility of the Industrial Truck," March 4, 1937) the functions of the industrial truck were briefly analyzed, and its advantages and limitations outlined. In these articles, too, a few of the more unusual services to which the modern industrial truck and tractor are particularly adapted were illustrated and described. In this portfolio a number of additional unusual applications will be found. These three articles are intended as a graphic introduction to a series of discussions to be published during the next twelve months on the economics of industrial truck and tractor use in American manufacturing plants. This equipment will be regarded as an aid to production primarily, and the arguments, pro and con, will be supported by facts and figures obtained from actual case studies.

A Beast of Many Burdens

Like the humble ass of Biblical days, there seems to be no limit to the kind of work the modern industrial truck can do effectively. For instance, the basic idea of *moving* is usually considered to be an act of *pulling* or carrying. In Fig. 1

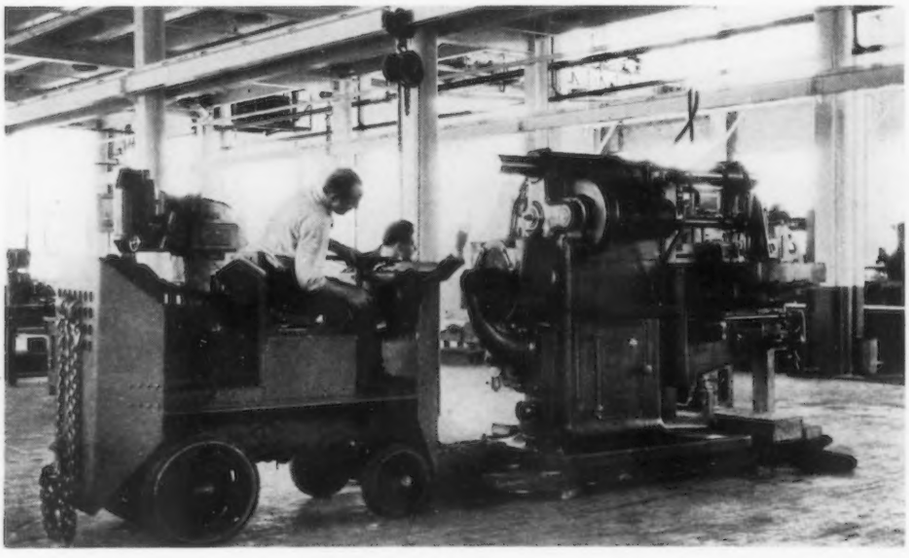


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FIG. 1—A Towmotor pushing four times its weight across a shop floor.

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Unusual Paces

A Portfolio Collected by
Francis Juraschek
Consulting Editor, Iron Age

a Towmotor tractor is shown *pushing* a heavy machine tool, on skids, to a new location in a factory. The weight that is being pushed is approximately four times the weight of the tractor, yet the movement is being accomplished with ease, gently, and surely.

Plant maintenance work is greatly facilitated by the use of such a telescopic platform-raising truck as is shown in Fig. 2. This is a standard Automatic of 3000 lb. capacity, of the type that is normally fitted with a lifting fork, for picking up pallet loads. In place of the fork a high platform has been attached to the telescopic lift mechanism, enabling a workman to reach any part of the walls and ceilings of a plant instantly.

Rolling mill coil handling has been speeded up lately by the use of trucks fitted with lifting rams. In Fig. 3 an Automatic heavy duty center control tractor equipped with a tilting ram-lift is shown raising a 16,000 lb. coil of strip steel for stacking in three-high tiers.

An odd job for a tractor (not

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FIG. 2 — An Automatic telescoping high-lift truck adapted for maintenance work.

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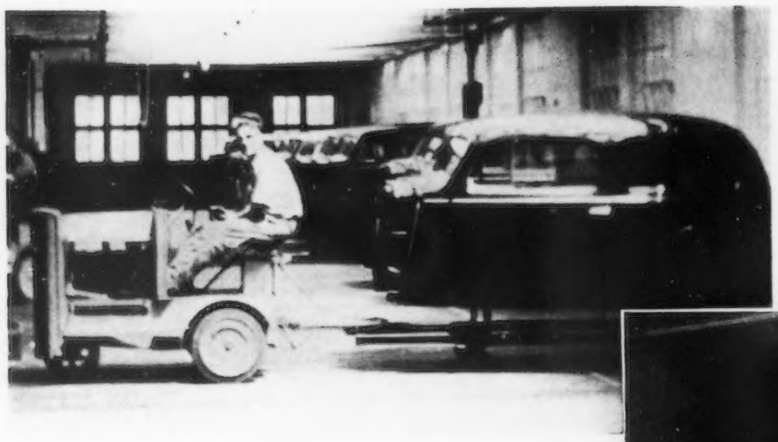
FIG. 3—An Automatic high lift ram truck picking up a 16,000 lb. coil of strip.



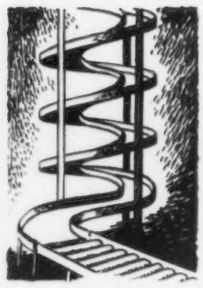


FIG. 4—A Mercury tractor handles automobile bodies mounted on wheeled skids.

ABOVE

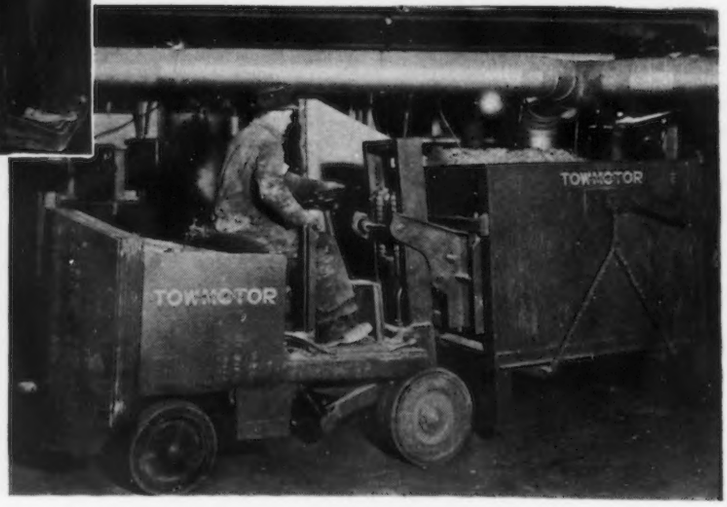
FIG. 5—A Yale lift-fork truck handling self-nesting stacks of zinc spelter.

BELOW

FIG. 6—An Automatic truck for handling bosh tanks in a tin plate mill.

BELOW

FIG. 8—A Towmotor truck picks up and carries a heavy hopper of glass waste.



ABOVE

FIG. 7—A 6,000 lb. high lift Automatic fork truck handling a load of plywood.

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FIG. 9—A coiled strip up-ender is an integral part of this Automatic truck.

common practice) is shown in Fig. 4. Here a Mercury tractor is taking an automobile body from temporary storage to the assembly line in a special-body plant. The bodies are kept in storage mounted on wheeled skids, and therefore may be moved without delay whenever wanted.

There's an interesting story back of Fig. 5. The Yale tilting fork-lift truck is picking up a load of zinc spelter blocks for delivery to the melting furnace. The blocks are so molded that, in stacking, the projecting lugs of each nest into the holes of their neighbors. Consequently no pallet is required. The entire load is dumped into the furnace, for it has formed itself into a "consumable pallet."

A process included in the manufacture of certain types of tin-plate requires the dipping of the sheets or strip into a "bosh" solution. To facilitate the economical transportation and storage of bosh tanks the Automatic truck shown in Fig. 6 was developed. The equipment, loaded, weighs 10,000 lb.

Unusual Loads

The Automatic telescoping high lift fork truck shown in Fig. 7 has a capacity of 6000 lb. The service illustrated is that of picking up and delivering clamped bundles

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FIG. 10—This Automatic mobile tractor-crane lifts 1,000 lbs. at 6 ft. outreach.

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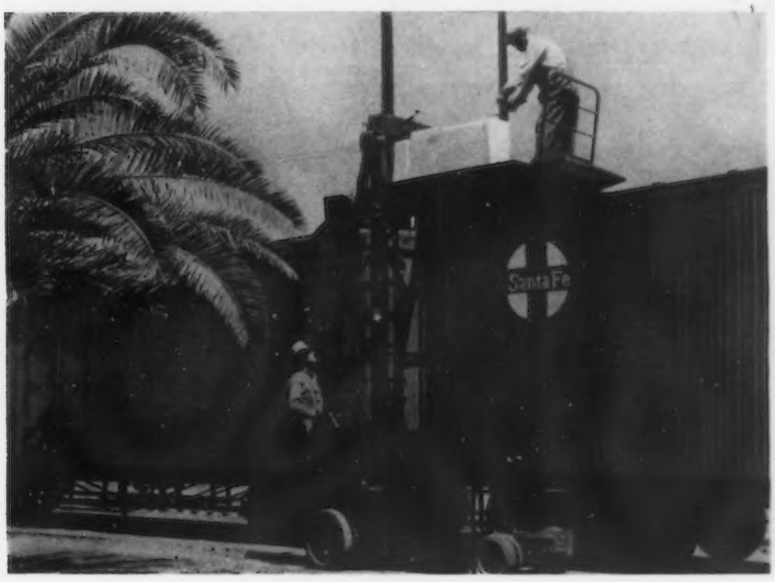
FIG. 11—A special Automatic truck developed for icing refrigerator cars.



of veneer or plywood from drying kilns to storage and to the trimming machines.

The Towmotor truck in Fig. 8 is used to serve 24 hoppers in a large glass plant. Glass waste coming from the various fabricating machines is deposited in these hoppers. When a hopper is full of waste the lift mechanism of the trucks picks it up bodily by a vertical hook which engages in a slotted fixture on the side of the hopper, wheels it away to the dump, where the discharge gates at the hopper bottom are opened and the waste dumped. The truck then brings the hopper back to the fabricating machines.

A special strip steel coil up-ender has recently been built into

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FIG. 12—The Krane Kar swing boom tractor crane handles up to 10,000 lbs.

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BELOW

FIG. 13—Special jack-lift trailer for die-handling, equipped with Metzgar wooden wheels.

an industrial truck by Automatic Transportation Co. This is shown in Fig. 9. The tilting special fork lift-mechanism is mounted on a turntable, so that the coil may be picked up in a horizontal position and delivered in a vertical position, or picked up in a vertical position and delivered horizontally. The coil carrying capacity is 16,000 lb.

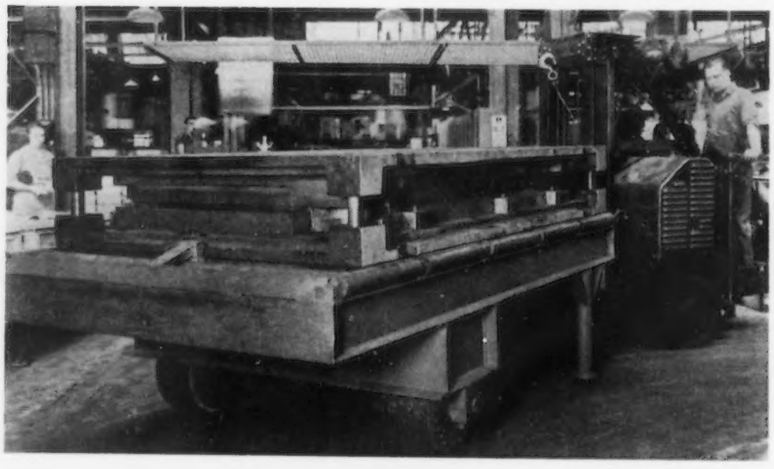
The Automatic tractor type crane shown in Fig. 10 is a versatile performer. Equipped with pneumatic tires, it can travel rapidly both indoors and out. The crane is rigid (that is, non-swivelling) and at six foot out-reach will pick up a load of 1000 lb.

A special icing truck developed by Automatic for use at railway terminals is shown in Fig. 11. With a capacity of 4000 lb., a grille platform which lifts to the level of the roof of a refrigerator car, and electric headlights, this type of truck is very popular in the Southwest.

Other Types

The Krane Kar shown in Fig. 12 may be gasoline or diesel engine powered. It may be classified as a "swing boom tractor crane." The telescopic boom raises from 12 to 18 feet, and the lifting capacity ranges from 5000 to 10,000 lb. in various models. Made by Silent Hoist Winch & Crane Co.

Fig. 13 illustrates a jack-lift trailer equipped with two Metzgar wooden wheels, each 18 in. diameter by 12 in. face. The trailer is being handled by a lift-platform indus-



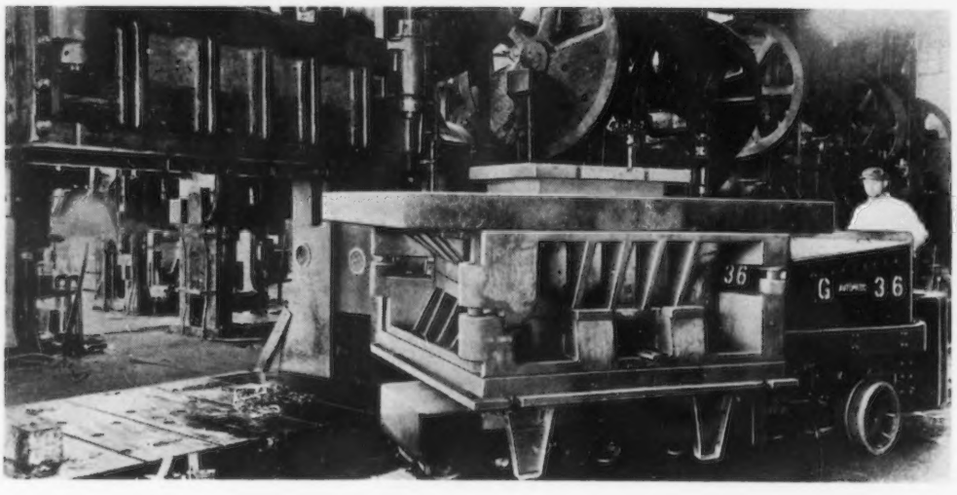


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FIG. 14—Automatic die-handling truck with a capacity of 30 tons.

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FIG. 15—Automatic truck with special platform for handling large cable reels.

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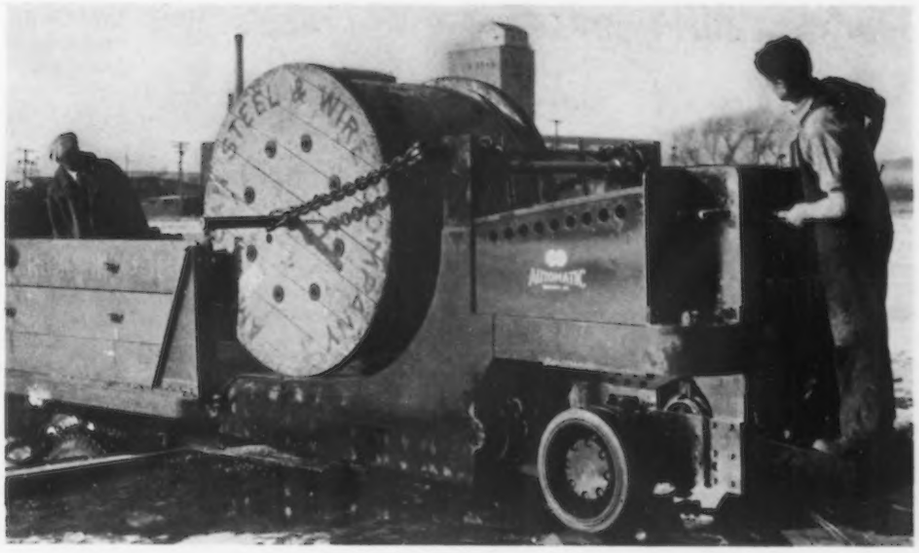

trial truck powered by a Ready-Power gasoline unit. The trailer is used mostly for handling heavy metal forming dies weighing from 10 to 15 tons, in one of the largest electrical refrigerator manufacturing plants.

Fig 14 illustrates a method of handling dies directly on a truck. The special Automatic truck shown has a load-handling capacity of 30 *tons!* It is in use in an automobile body plant for taking sets of dies from presses to storage.

In Fig. 15 a heavy duty Automatic truck of 10,000 lb. capacity is shown fitted with a special platform to receive large diameter cable reels from street trucks at the loading platform, and to take them to storage.

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THE Carboloy-tipped tool on this large boring mill at the Schenectady plant of the General Electric Co. has been in use seven years in turning the outside diameter of motor and generator commutators. During this time it has turned more than 800 commutators, involving 4400 miles of cutting copper and mica alternately. Engineers in the company's works laboratory, where the tool was designed, estimate that it has attained only about half of its life.

The operation consists of rough turning the outside diameter of a commutator on the down cut at a speed of 400 ft. per min. with approximately 1/32 in. feed and about 1/8 in. depth of cut. During its upward travel, the tool takes a finish cut at the same speed, removing 0.015 in. of copper and mica with a feed of 0.015 in. While turning one commutator the tool travels about 5½ miles.

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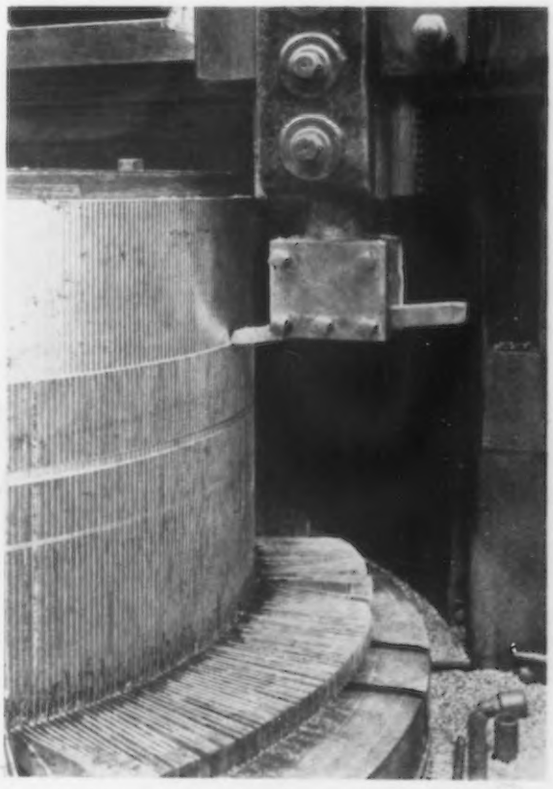


Haynes Stellite Introduces New Cutting Tool Material

A NEW, patented cobalt-chromium-tungsten alloy, known as Haynes Stellite-2400, for metal cutting tools, has been developed by the Union Carbide & Carbon Research Laboratories, Inc., and the Haynes Stellite Co., two units of Union Carbide & Carbon Corp. Tools made of this material have greater edge strength and operate with economical tool life at even higher speeds that the company's J-Metal, with no reduction of feeds and depths of cut. They are marketed in a variety of sizes of solid square and rectangular tool bits, welded tip tools, milling cutter blades, and special small tools to suit requirements.

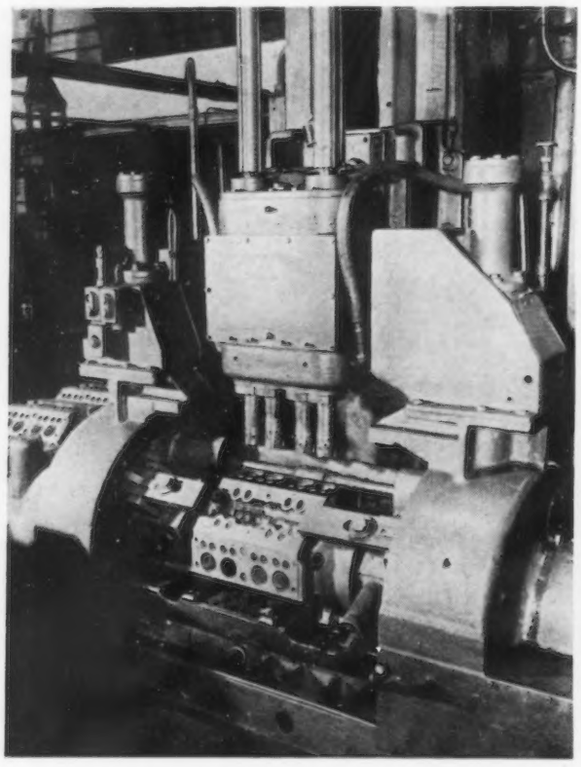
It is stated that on production operations, this new alloy has given excellent performance in roughing and finishing cast and forged steels; nitrided stainless, and other alloy steels; and cast and malleable irons. Wherever production requirements and other conditions make it possible to increase machining speeds and feeds over those obtainable with J-Metal tools, Haynes Stellite-2400 can be used with reasonable assurance of success. The most outstanding performance is obtained at such increased speeds and on jobs where tool life is a major factor in the maintaining of constant production. The speeds and feeds recommended are from 10 to 50 per cent greater than those for J-Metal.

The new alloy is being used for the production machining of gear blanks, where the surface speed is 200 ft. per min., the feed is 0.064 in. per revolution, and the depth of cut, ½ in. It is also being employed to advantage in the rough boring of the automotive cylinder blocks, as shown with accompanying illustration. This operation is performed on a special machine and the time for rough boring is 43 sec. Six cutting blades are used in each boring head. Speeds and feeds are: surface speed, 78 ft. per min.; feed, 8.5 in. per min.; and depth of cut per tooth, 0.0124 in.

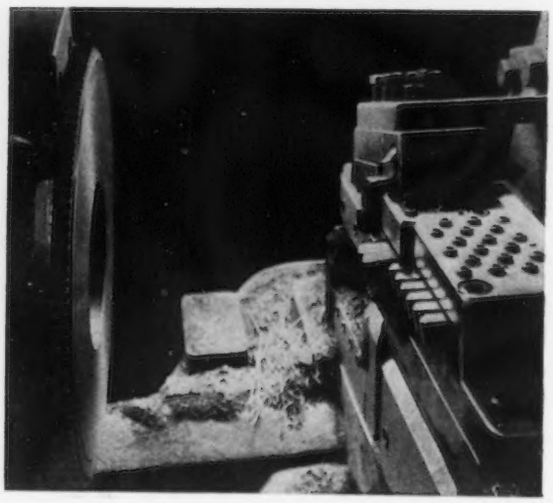
The clutch side of cast-iron automobile flywheels is rough and finish faced and bored with Haynes Stellite J-Metal and 2400 tools. Six tool bits, arranged as shown in the illustration, are used for rough facing. The three bits facing nearest the outside diameter are of the new material, and those operating at a lower surface speed, nearer the center, are of J-Metal. When the rough facing is completed, the finishing cut is taken with a scraping tool of J-Metal. Total actual cutting time for both operations is 1 min. 15 sec. The machining is done at 24 r.p.m. (equivalent to a surface speed of 86 ft. per min. at the outside diameter), a feed of 0.032 in. per revolution, and a depth of cut of ⅛ in.

It is stated that a number of shops are employing the new alloy on high-chromium and stainless steels. In one case Haynes Stellite-2400 was adopted for machining stainless steel poppet valve castings in an effort to overcome tool breakage. Operating under exactly the same conditions as the facing and boring tools it replaced, the new tools turn out well over 50 pieces between grinds. The machining operations on this 4½-in. outside diameter casting include rough and finish turning two diameters, tapering, facing and boring. The facing and boring are done at 61 r.p.m. (equivalent to a surface speed of 72 ft. per min. at the outside diameter), a feed of 0.005 in. per revolution, and a depth of cut of ⅛ to ¼ in. Rough and finish turning are done on a separate machine with about the same feed and depth of cut, but the surface speed is higher—125 ft. per min. About 30 pieces are turned and tapered between tool grinds.

Operating conditions recommended for the Haynes Stellite-2400 tools are much the same as those for all high-production cutting alloys. Fixtures, tool holders and work must be as rigid as possible, and tool overhang should be kept to a minimum. Spindles, clutches,



(At left) These cylinder blocks are rough bored with the new Haynes Stellite-2400 cutting tools in 43 sec. (Below) Rough and finish facing and boring C. I. flywheels with the new tools.



gears, and belts should be checked regularly to assure a minimum of play, which might cause vibration or backlash. Driving motors should have sufficient reserve power to provide for accidental overloads. In addition, the feed should always be thrown out before the machine is stopped to prevent possible breakage of the tool.

The material can be ground either by hand or by machine. In general, any soft grade vitrified grinding wheel, not coarser than 46 nor finer than 60 in grade I or J of the Norton system, or grade M or N of the Carborundum system can be used with satisfactory results.

Air Drive for Paint Agitators

THE DeVilbiss Co., Toledo, has announced a new air motor drive for agitators built integral in paint drums. The unit consists of a standard air motor and a reduction unit, and offers a safe method of agitating paint in shipping containers prior to its delivery to the material feed system in the finishing department.

Included are two drivers, one for ½-in. square and one for ⅝-in.

square in the agitator shaft. These drivers are threaded to fit the thread on the drive shaft. An adapter with 1½ and 2½-in. straight male thread, and 1¼-in. female thread to fit the openings in the paint drums is also included.

The unit is easily portable, and may be transferred from one drum to another in a few moments time. The unit will operate from a 1-hp. or larger air compressor, dependent upon the speed of agitation required. The speed of the motor is adjustable from 10 r.p.m. up.

Line of Motorized Chaser Grinders Replace Outmoded Models

THE Landis Machine Co. of Waynesboro, Pa., announces a new line of chaser grinders to replace the outdated Model "Y" and No. 2 grinders. The new line consists of three models that cover the range of sizes of Landis chasers.

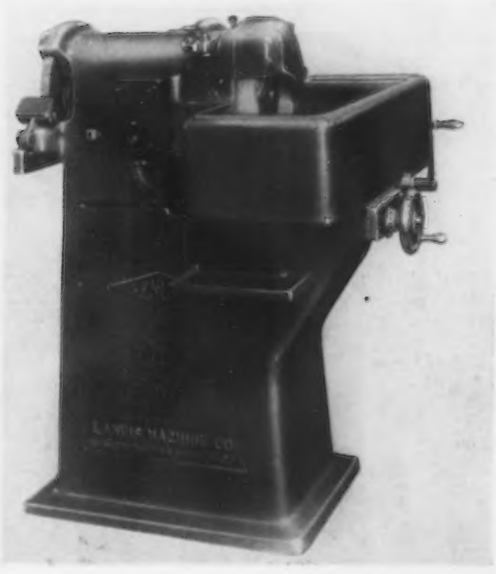
These grinders are all motorized, the grinding wheels being mounted directly on the armature shaft. Two grinding wheels, one cup and one straight, are standard equipment. The grade and grain, as well as the size of the wheels, were especially selected because of their longer life and efficiency in grinding.

The straight wheel is used for grinding the rake angles of Landis bolt chasers where leadscrew is not used. The cup wheel is used for grinding the lead and rake angles of all pipe chasers and bolt chasers when the thread is to be cut with the use of a leadscrew.

The motors are of the ball-bearing, continuous duty type. A ball thrust bearing assumes the thrust load of grinding chasers on the face of the cup wheel.

The Model O is a machine designed primarily for the grinding of chasers for the smaller sizes of Landis die heads. The No. 1 grinder is a heavier duty machine and may be used for grinding all Landis chasers up to 1⅞ in. wide. This machine replaced the old Model Y grinder. The No. 1½ grinder is an extra-heavy duty machine designed for grinding the largest Landis chasers under the most severe production conditions. This grinder is the only one of the three models in which means are provided for the use of a coolant on the cup wheel. The Model 1½ is also the only grinder that employs a traversing table at the cup wheel end.

The Model O and the No. 1 grinder employ a new method for infeeding the chaser and passing



ABOVE

Landis Model O for grinding the smaller sizes of the company's die heads.

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AT LEFT

Heavy-duty Landis machine, No. 1½, for dressing the largest chasers under severe production conditions.

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it back and forth across the face of the wheel. The swivel head in which the chaser is gripped for grinding, is mounted on a cylindrical base, operating on a spindle and fitted with a long handle. A feed screw is provided through the spindle to infeed or withdraw the swivel head. The infeed screw and the bearings on which the swivel head base operates, are effectively protected from the possibility of grit entering the sliding surfaces. An additional feature of this fixture is an adjustable stop for limiting the length of travel of swivel head parallel to the wheel. Although the usual practice is to grind the lip rake angle of chasers by hand on the straight wheel, it is now possible to grind this angle on the cup wheel, if desired.

A new type of swivel head is employed on all models. The chaser clamping screw contacts the chaser on the dovetail surfaces in the same manner as the chaser clamp on a die head. This provides a rigid and secure support to the chaser and insures that the rake and lead angles are accurately ground. The swivel head is fully graduated.

Industrial Type Propeller Fan

A FOUR bladed propeller fan is being offered by the Trane Co., La Crosse, Wis., for use in unit heaters, unit coolers, evaporative condensers and other apparatus requiring relatively large volumes of air at moderate pressures. The fans are built with four curved steel blades of large area set at an angle of 30 deg. to the plane of rotation. The curvature of the blades is such as to insure the leading edges entering the air stream without shock. Their wide tips provide for the gradual acceleration of the air particles so as to insure quiet operation at high efficiency.

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Grinder Arranged for Rough and Finish Machining of Alloy Rolls

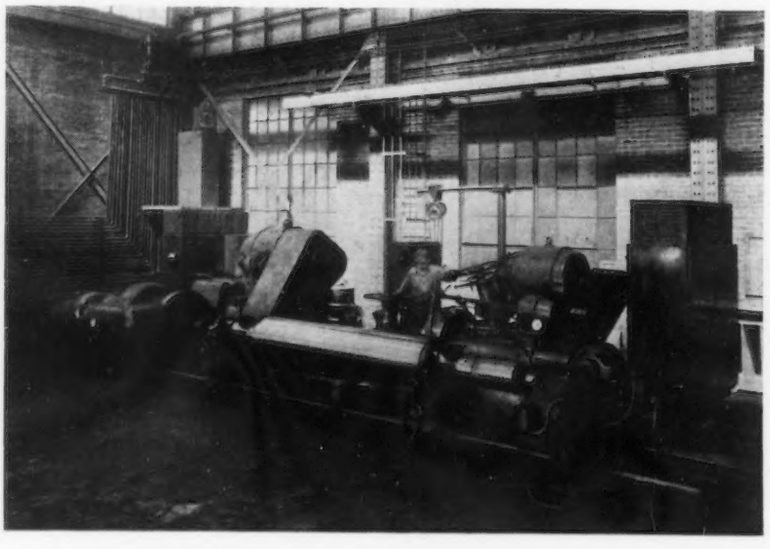
FOR the complete machining of certain special alloy chilled iron rolls containing a high percentage of nickel and having a scleroscope hardness of 80 to 85, the Landis Tool Co., Waynesboro, Pa., recently furnished the roll grinding machine here pictured. Because of the toughness of these rolls, the machine is required to rough them, without the usual preliminary turning operation, as well as to finish grind them.

This roll grinder is a 36-in. by 18-ft. Landis type 30 unit, but has an extra long rear bed-section on which are mounted two grinding wheel carriages, one of conventional type for the finishing operation and the other, of special design for the roughing operation. Because of the length of the rear bed section it is possible to run the finishing wheel carriage to the end of the bed and leave it inoperative while the second carriage rough grinds the entire length of the roll. When the roughing is completed the rough grinding wheel carriage can be run to the opposite end of the bed and the other carriage brought into position for finish grinding of the roll.

The roughing wheel is 36 x 12 x 18 in. in size. It is made up of two 36 x 6 x 18 in. wheels mounted against each other on the center of a massive wheel spindle, the wheels thus being carried between the bearings, instead of on the end of the spindle. The roughing spindle is almost 58 in. long, and is 5¼ in. and 8 in. in diameter at and between the bearings respectively. The wheel is driven by a motor on the rear of the head, through multiple V-belts.

In grinding a roll body 79 in. long and 25 in. in diameter, stock of 0.150 in. is continuously removed at the unusual rate of 8 cu. in. per min. It is stated that in previously rough grinding the same rolls on a conventional type roll grinder, one 30 x 3 x 12-in. vitrified wheel wore out in rough grinding one roll, whereas 17 to 18 rolls may be rough ground on the machine illustrated using the two 36 x 6 x 18-in. resinoid wheels. In addition to reduced wheel costs, there is a marked advantage in not having to move the roll from the roughing machine to another for finishing.

The machine weighs 195,000 lb. including all electrical equipment. Thirteen electric motors, totaling 224½ hp., are employed. The roughing wheel drive motor is 100 hp., the finishing wheel drive motor 75 hp., and the work drive motor 25 hp. The other motors range from ½ to 3 hp. Use of anti-friction bearings on the roughing head is said to obviate the necessity for a wheel-spindle oil



IN this view of the Landis dual wheel carriage roll grinder, the roughing carriage is in the operating position. In grinding a 79-in. long, 25-in. diameter roll body, 0.150 in. stock is removed at the rate of 8 cu. in. per min.

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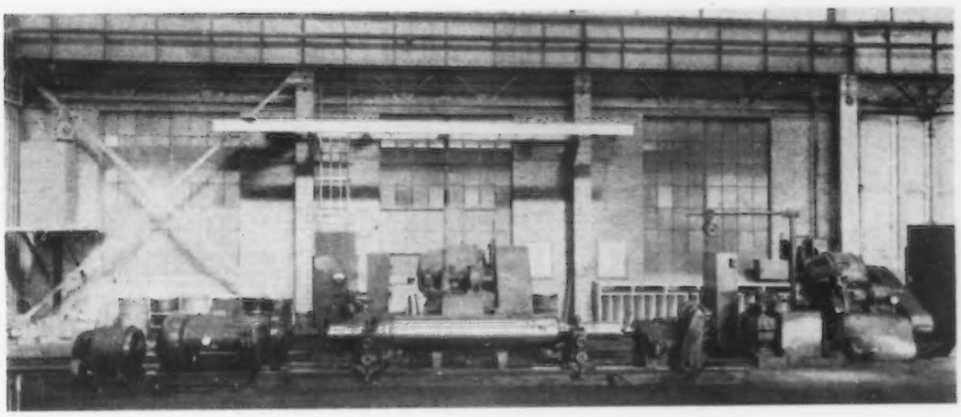
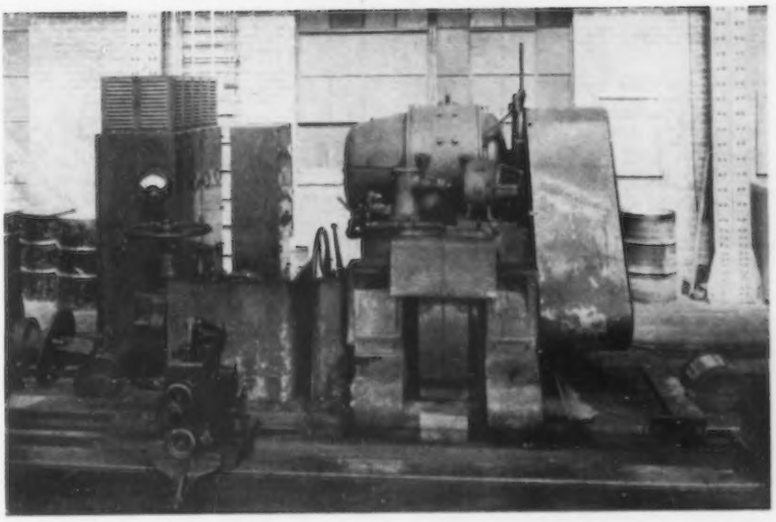
FRONT view of Landis dual wheel carriage roll grinder with the finishing carriage in the grinding position. The roughing carriage is at the end of the special rear bed section, awaiting use on the next rough alloy chilled iron roll.



pump motor on that head. No wheel dressing is required for the roughing wheels as they break down properly during grinding. Another feature is that the roughing wheels may be changed during the finish grinding operation, thus eliminating shutdowns.

All motors may be controlled from the wheel-carriage that is operating. The work drive motor rheostat is equipped with remote control so that it may be operated from the operator's platform on the wheel carriage. Wheel-carriage motors are interlocked so that when one is operating the other cannot operate. Dynamic braking is provided for the large roughing wheel; it becomes operative as soon as the wheel drive motor has stopped. A jog switch at the front of the headstock enables the operator to examine the roll thoroughly from the front of the machine. Limit switches prevent overtravel of wheel carriages or wheel bases.



CLOSE-UP of front of roughing wheel-carriage. Two 36-in. resinoid wheels are mounted against each other on the center of a massive spindle, as shown.

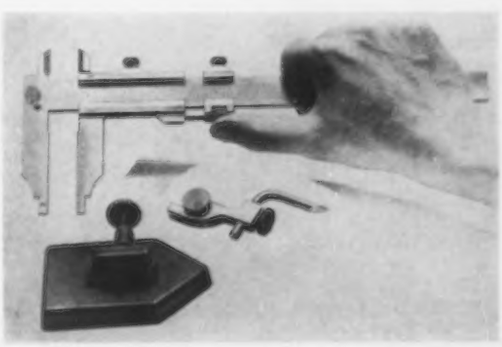
It is stated that the dual carriage arrangement can be applied to any size of the company's type 30 roll grinders.

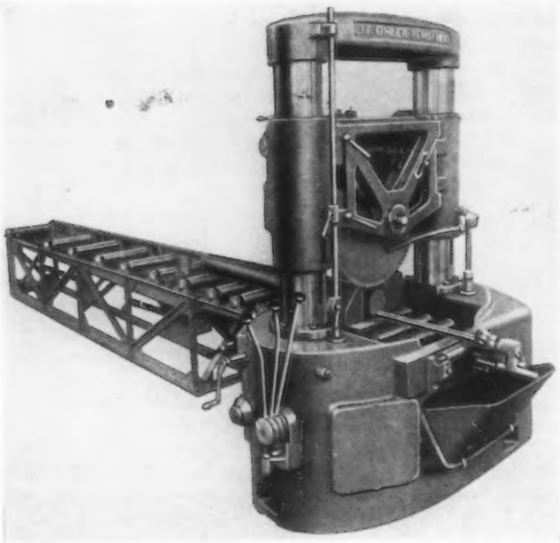
Combination Vernier Caliper and Height Gage

A MAUSER No. 537 vernier caliper with combination height gage is being offered by George Scherr Co., 128 Lafayette Street, New York. It comes in three sizes with measuring capacities of 7, 9 and 11 in. and is graduated in thousands and 1/128ths of an inch. The vernier caliper has two knife edges which are useful for layout work, also for measuring distances between holes, root diameters of gears and the like.

To transform the caliper into a height gage, a base is furnished to which the caliper is attached by means of a screw and tapered center at the end of one jaw. A scribing attachment is a separate unit and may be applied to the upper jaw by means of a knurled thumb screw. The steel point is also adjustable. The base is of new design, much heavier and wider in area so that the height gage will rest firmly on the surface plate.

COMBINATION vernier caliper and height gage.





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OHLER cold sawing machine, the No. 660, equipped with a 13-ft. long hydraulically-driven roller conveyor.

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Ohler High-Speed Cold Sawing Machine

THE accompanying illustration shows one of the hydraulic high-speed cold sawing machines built by J. F. Ohler, Remscheid, Germany, and being placed on the American market by A. Klingelhofer, Inc., 103 Lafayette Street, New York.

Unusual rigidity, with vibrationless operation even in heavy cutting, is attributed to the frame design, which incorporates two cylindrical columns mounted on a heavy base and closed by a heavy upper cross-tie, as shown. The hydraulically operated saw carriage, mounted on the ground cylindrical columns, as shown, provides additional reinforcement for the frame.

The saw blade is mounted in the exact center of the carriage and a hydraulic vice clamps the material directly under the center of it. Cooling compound is fed into the cut from both sides of the blade, the cutting teeth of which are always immersed in coolant.

The saw carriage is moved to and from the work by means of two hydraulic units, one in the base of each of the upright columns, an arrangement emphasized as providing balanced and smooth operation of the saw carriage. Rapid traverse to and from the work is provided. A hydraulically-operated roller conveyor at the rear of the machine moves the bars or other material to be cut to or away from the saw blade as desired.

Hydraulic and other controls are conveniently located at the front of the machine. Hydraulic control is by three levers, which are interlocked to prevent possible operating errors. One lever operates the roller conveyor, which is driven by an oil-motor; the second operates the hydraulic vise; and the third controls the movement of the saw carriage, which has rapid return to the upward position either automatically or manually by reverse movement of lever No. 3.

The feed of the saw is adjustable in infinite steps from 0 to 20 in. per min. by means of a dial. Above the dial there is a crank for resetting the vice. Another lever controls the motor-driven coolant pump and there is a push button station for starting and stopping the main motor. On the smallest machine all hydraulic motions are controlled by a single lever.

The main motor drives through a gear box which provides six different saw speeds ranging from 26 to 140 ft. per min. Gears are of chrome-nickel steel, hardened and ground, and shafts are mounted in roller bearings. The saw blade is carried in heavy bearings, one of which is mounted on a heavy hinged frame that can be opened like a door to facilitate changing of saw blades.

Ohler segmental-type saw blades are employed. The segments, made of high-speed steel are tongued to fit into a milled groove in the body of the saw blade, which is made of alloy steel. They are held in the saw by means of three rivets, and an extra rivet connects each segment with the other. It is stated that cutting teeth can be reground as many as 20 to 25 times. An automatic machine for sharpening these saws is available.

Four models of the machine are made. The largest, the model 1000, is designed to use 36, 40 and 44-in. saws. With the smallest and largest blades, the capacity is, respectively: Rounds, 12 in. and 15¾ in.; squares, 10¾ in. and 14 in.; and I-beams, 16 in. and 24 in. Floor space of 4 x 6½ ft. is required for this machine, which weighs 17,500 lb., with electrical equipment. A 13-ft. long conveyor weighing 3000 lb. complete is available with this machine.

Pattern Label Embossing Machine

THE hand-operated label embossing machine illustrated, named the U. S. Labelograph, is being offered by the Miller Engineering Machine Co., 31 East Kinney Street, Newark, N. J., for making labels as needed for wood patterns, storage bins, drawers, crates and boxes, etc., in foundries and other departments of industrial plants. The labeling material is monel metal strip, 0.005 in. thick and 9/16 in.

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HAND-OPERATED machine for marking labels on wood patterns, storage bins, drawers, and the like, as needed.

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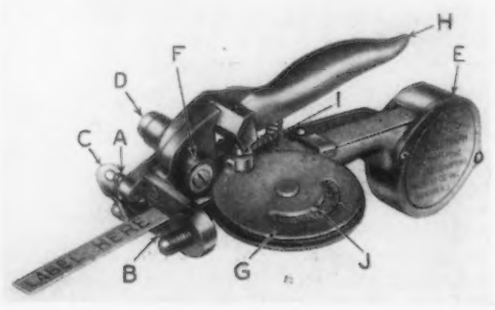


wide. It is carried in a coil of about 30 ft. in the magazine *E*, and is supplied with perforated holes at intervals for convenience in nailing or tacking of the labels.

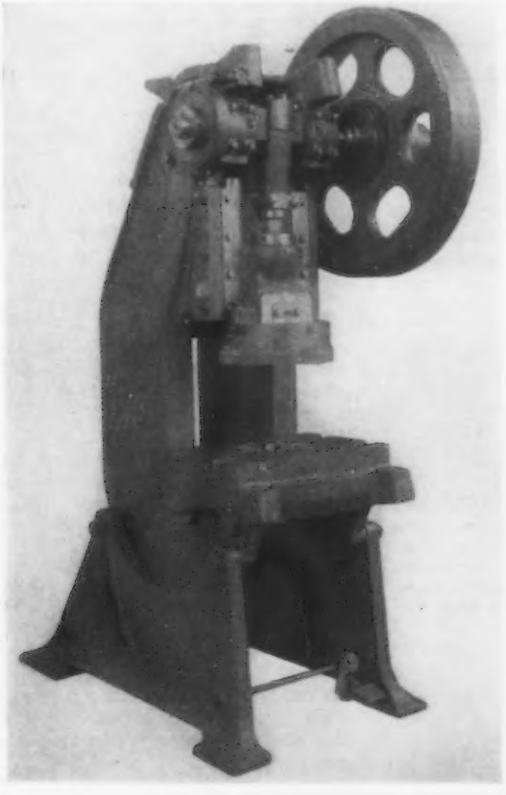
The machine is made largely of aluminum. It is held the same as any ordinary hand punch and is operated by means of the lever *H*, which, squeezed down by the hand, forces the dies into the metal. Upon release of hand pressure, the strip automatically feeds out a distance of one letter or number. Letters and numbers are selected by rotating the knurled rim of the disk *G* until the letter or number desired is opposite the pointer *J*. The label is spaced or fed out of the machine without embossing by means of a ratchet mechanism at the back. A pair of small snips is supplied with the machine for the cutting off of completed labels at the point desired.

New Marquette Slide Cushion

A NEW, compact pneumatic cushion for use in conjunction with the Calleson blanking, drawing and curling dies to replace springs or rubber cushions, and also adaptable to stripping and blank-holding operations has been brought out by the Marquette Tool & Mfg. Co., Toledo, Ohio, a division of the E. W. Bliss Co. The cushion is mounted under the slide, as shown in the illustration.

The functioning of this cushion as a stripper is claimed to have a number of advantages over the spring type. No jacking-back of the stripper plate against stiff springs is necessary when setting dies. All that is required is to release the air from the cushion and the stripper plate will easily slide back out of the way. As no springs are used, spring breakage is eliminated. Another advantage claimed is that stripping may be controlled in a positive manner so that the cushions will operate at the correct moment. With the use of these slide cushions and the regular cushions in the bed a single-action press may be converted into a triple-action press.

When the cushion is used with Calleson dies the cushion and the draw ring proceed down together, blanking and drawing the shell. In the next step the upper ring recedes while the lower forming die, actuated by either air cushions or springs, pushes upward, forming the edge curl against the pressure of the slide cushions, pushing on the top of the cover. When the edge is completely curled the slide cushion recedes with the upper draw ring while the lower forming die ejects the shell. The stroke of the slide cushion must be the length of the edge curl. A flexible hose connects the cushion with the air supply. These cushions are built in all sizes.



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MARQUETTE press equipped with pneumatic cushion for use in conjunction with Calleson blanking, drawing dies and curling dies and also adapted to stripping and blank-holding operations.

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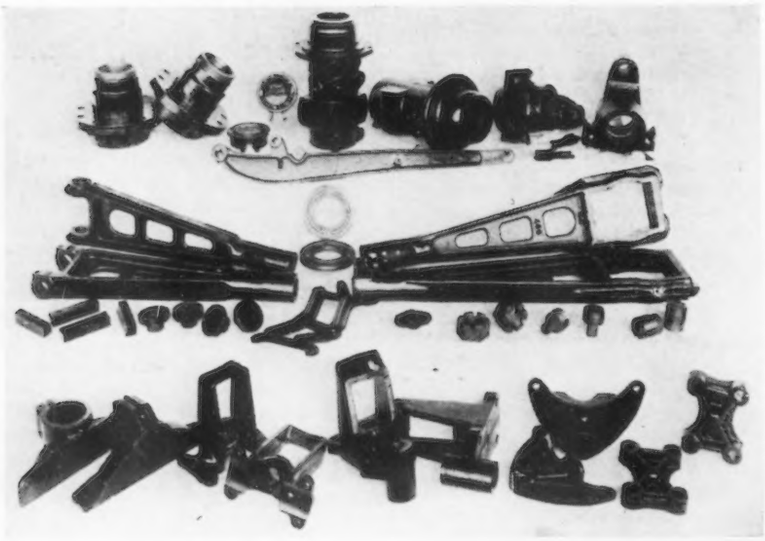
Variable Speed Flexible Shaft Equipment

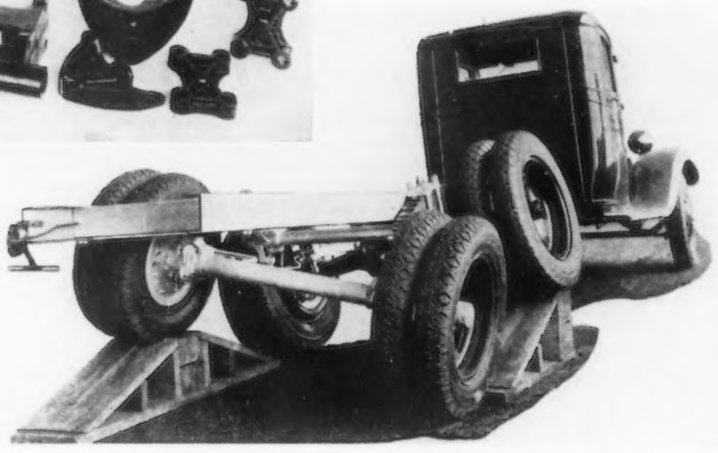
A NEW floor type of flexible shaft power driven tool equipment has been introduced by the Charles L. Jarvis Co., Middletown, Conn., in which 12 to 14 speed changes are available without it being necessary to stop the motor. The unit is particularly useful for driving portable hand grinders where a constant peripheral speed is desired regardless of wheel wear. With the speed range available, for example, a 10-in. grinding wheel may be worn down to 4½ in. diam. before it need be discarded.

As in other standard Jarvis types, a totally enclosed, ball bearing motor is employed. Type VF 1 has a 1-hp. motor and has shaft speeds from 2200 to 4700 r.p.m.; types VF 15 and VF 2 have 1½ and 2-hp. motors, respectively, and speeds from 2000 to 4500 r.p.m. The units are mounted on heavy cast iron bases with large rubber tired, ball bearing wheels. The motor unit swivels the full 360 deg.

Drive from the motor is through a split V-belt sheave to the transmission shaft which is mounted in an eccentric bushing, the position of which is controlled by a radius knob and ratchet sector. The V-belt automatically accommodates itself to changes in center distance by finding its diameter on the spring-backed driver pulley. This replaces the standard cone pulley construction and permits changes of eccentric position and hence driver pulley operating diameter to be made while the motor is running. The transmission shaft is mounted in a pair of sealed ball bearings in the eccentric, and the handpiece has two double-row ball bearings. Spindle diameters on the three sizes range from ¾ to 1 in.



MALLEABLE castings used in assembly to convert standard four-wheel trucks to six wheelers. (Below) Complete six-wheel assembly; all cast parts are made of malleable iron.



Motor Trucks Require Strong Parts

MOTOR trucks, whether four wheel or six, encounter unusual shocks and stresses. In converting Ford and Chevrolet trucks to six wheelers, such as here shown, the Acme Six Wheeler Co., Cadillac, Mich., employs malleable iron for all cast parts, chiefly because of the strength, ductility and high shock resistance of that material, but also because of the comparatively lighter weight and the ease of machining. Some parts are used in the as-finished condition, without machining, and the smooth surface of all the castings makes for a minimum of preparation for pointing, enameling or plating.

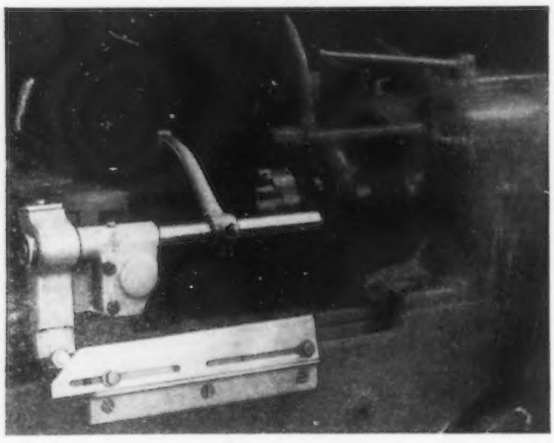
The conversion from a four wheel to a six wheel truck includes an extension to the frame, together with a floating rear axle, and the extra wheels necessary to carry the additional load resulting from extension of the frame and body. Malleable parts employed are shown in the second illustration; in the rough they weigh 352 lb., or about one-third of the total weight of the entire equipment in which these parts are used, exclusive of the wheels and tires.

Automatic Stop for Landis Threaders

AN automatic work stop has been designed by the Landis Machine Co., Waynesboro, Pa., for use on its Landmaco threading machine, and for other Landis standard front threaders employing a model A carriage front. The attachment can be used to advantage where it is desired to locate stock in the same relative position for threading; it is particularly applicable in operations where the thread is close to a shoulder and where thread length must be maintained. Fully automatic in action, the device makes for better production, especially when a number of similar pieces are to be threaded.

The stop arm, mounted as shown in the illustration, is adjustable on the horizontal shaft up to the length of the carriage travel. One end of the shaft is fitted with a pinion that meshes with a vertical rack. A cam fastened to the machine bed actuates the movement of the stop arm as the carriage moves forward or backward. A roller on the end of the rack operates on the cam to reduce friction between the cam and the rack. The cam has elongated slots that make it adjustable to any position.

When the carriage is back or in position for loading or unloading, the stop arm is down. After the piece to be threaded has been gripped in the vise, the cam is set so that the arm rises with the first forward movement of the carriage. This eliminates the possibility of the arm striking the head of the machine.



AUTOMATIC work stop for Landis Machine Co. Threaders employing the company's model A carriage.

Air-Operated Drop Stamp For Sheet Metal

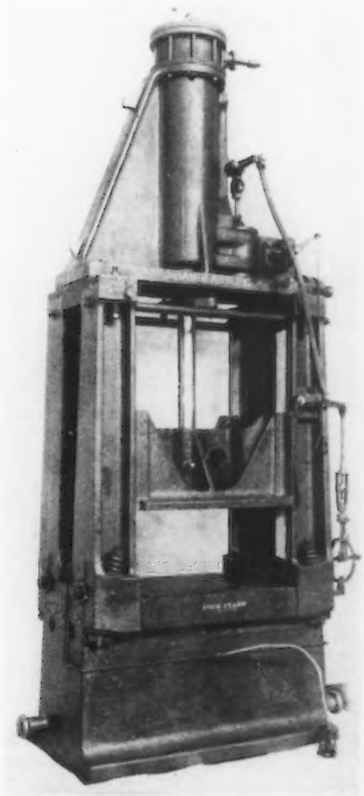
A NEW technique in the drop stamping of light sheet metal parts is available with the "Cecostamp," manufactured by the Chambersburg Engineering Co., Chambersburg, Pa. It is a machine that employs an air-actuated piston instead of a simple drop hammer. While designed chiefly for the aircraft industry, it has application wherever large, shallow draft sheet metal forming operations are desired and where expensive dies are not warranted. A certain amount of hand peening is usually necessary with a drop die, but the machine illustrated permits the operator to do much work by power which would otherwise be solely a hand operation.

The Cecostamp is designed to accommodate the lead and zinc dies commonly used on rope lift drop hammers. Such dies are low in first cost and the metal can be salvaged for other forms. The machine comes in a series of sizes, measuring 41 by 36 in. on the working face of anvil and ram of the smallest size, to 120 by 120 in. on the largest. The unit may be operated from the usual shop air pressure of 75 to 100 lb. per sq. in.

Construction follows many features incorporated in Chambersburg steam hammers. The cylinder is a "Cecolloy" casting embodying self-draining and safety valve design. The patented safety cylinder cover provides a cushion of air at the top of the cylinder not subject to the pumping of the hammer. It prevents broken cylinder covers and resets immediately upon functioning. The throttle or on-and-off valve is of the rotary, self-seating type, whereas the operating valve is a balanced piston type, actuated by cam on the ram incline without fixed connection. Porting is so arranged that rapid motion of the control lever permits free drop of the ram, while a slow motion permits decrease in speed, with squeeze exerted at end of stroke.

Control of the ram is sensitive. The lever is pivoted so as to be swung in a horizontal arc for convenience of the operator in any position. Upward and downward swing of the handle controls the rise and fall and speed of the ram, which cannot strike a blow except when the operator releases a catch on the operating lever. Pneumatically actuated safety catches also maintain the ram in either of two raised positions for working on dies or loading, and a safety foot pedal controls their release.

Four I-beam section frames are used to maintain accurate guidance of the ram and to connect the cylinder frame with the anvil. Heavy bolts and springs positioned at an angle secure the frames to the anvil, which is also a Cecolloy casting, without cores. The ram is another steel casting, machined at guides and face and drilled for attachment of dies to suit the user.

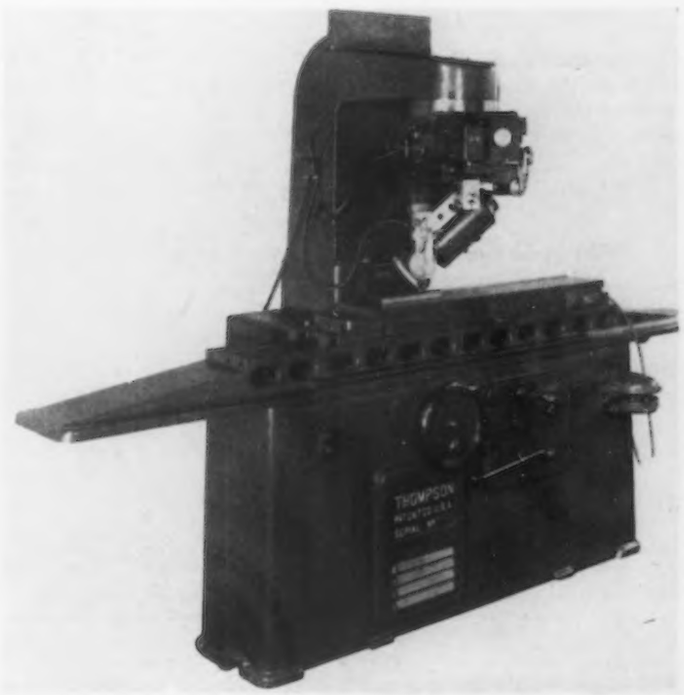


Surface Broach Grinding Machines

THE Thompson Grinder Co., Springfield, Ohio, has brought out two new broach grinding machines, one automatic and one manually-operated, for use in the manufacture of flat or surface broaches or for the resharpening.

The automatic machine, illustrated herewith, is operated hydraulically and locates tooth spacing automatically. A small locating finger is provided for positioning the broach tooth relative to the grinding wheel. The wheel-head is provided with a longitudinal slide and swivel to accommodate various tooth and rake angles, and the entire wheel-head unit may be adjusted in angular relation to the broach in order to grind the teeth at an established angle with the broach axis. Table operation is in timed relation with the wheel-head stroke, and can be operated at a variable speed. The wheel-head is designed for 6 in. diameter wheels.

The manually-operated machine locates broach teeth either to a predetermined spacing or from established teeth. Both units are built in 6 x 48-in., 6 x 60-in. and 6 x 72-in. sizes.



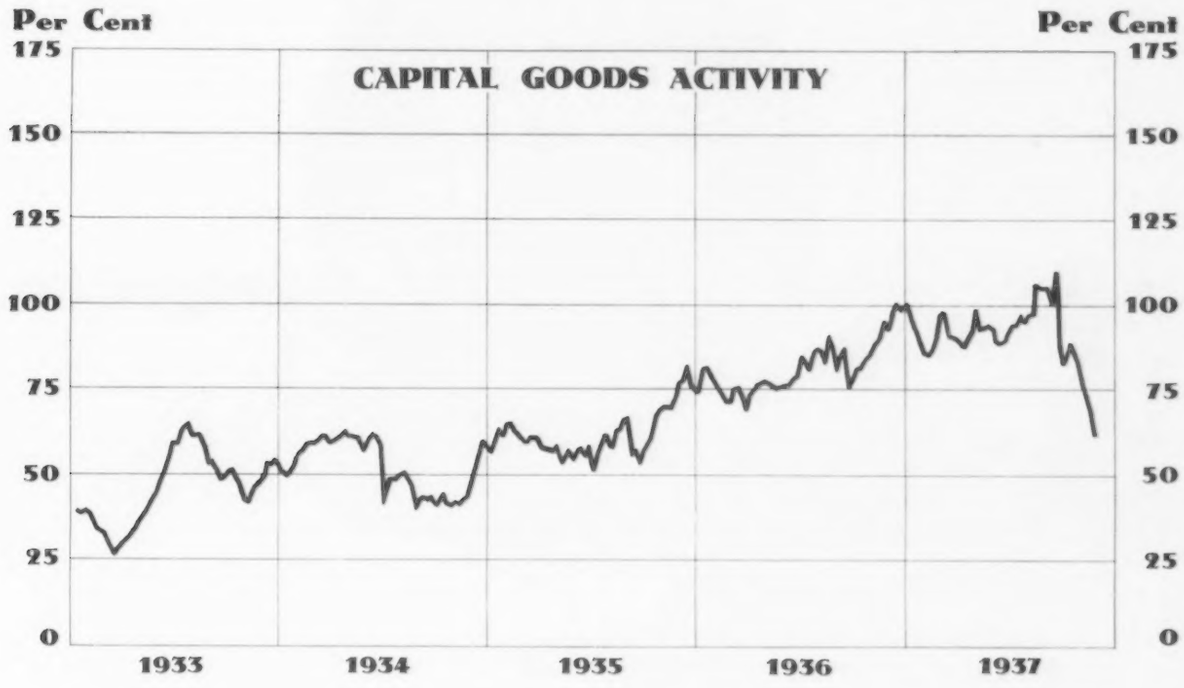
Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available. Bold Face Type Indicates Changes This Week.

	October, 1937	September, 1937	October, 1936	Ten Months, 1936	Ten Months, 1937
Raw Materials:					
Lake ore consumption (gross tons)[a]	4,203,873	5,157,411	4,384,908	35,818,890	49,344,994
Coke production (net tons)[b]	.....	4,679,875	4,307,849	37,420,040	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	2,892,629	3,410,371	2,991,887	24,556,395	33,114,269
Pig iron output—daily (gross tons)[c]	93,311	113,679	95,512	80,513	108,928
Castings:					
Malleable castings—production (net tons)[d]	.....	52,728	51,778	459,088	.....
Malleable castings—orders (net tons)[d]	.....	41,652	55,521	451,147	.....
Steel castings—production (net tons)[d]	.....	83,047	74,775	653,202	.....
Steel castings—orders (net tons)[d]	.....	57,414	59,431	673,256	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	3,392,691	4,301,869	4,534,246	38,060,388	45,891,460
Steel ingot production—weekly average (gross tons)[e]	765,844	1,005,110	1,023,532	873,546	1,056,676
Steel ingot production—per cent of capacity[e]	58.31	76.52	78.15	66.69	80.67
Finished Steel:					
Trackwork shipments (net tons)[e]	6,137	8,101	5,547	58,478	84,028
Fabricated shape orders (net tons)[g]	.....	117,859	127,303	1,311,550	.....
Fabricated shape shipments (net tons)[g]	.....	154,295	152,999	1,285,046	.....
Fabricated plate orders (net tons)[d]	.....	31,484	33,791	390,629	.....
U. S. Steel Corpn. shipments (tons)[h]	792,310	1,047,962	1,007,417	8,875,124	11,749,156
Ohio River steel shipments (net tons)[i]	89,750	122,600	145,065	930,446	1,097,395
Fabricated Products:					
Automobile production, U. S. and Canada[k]	.....	175,620	229,989	3,692,023	.....
Construction contracts, 37 Eastern States[l]	$202,090,900	$207,071,800	$225,767,900	$2,267,396,100	$2,509,095,200
Steel barrel shipments (number)[d]	.....	725,699	924,797	6,971,797	.....
Steel furniture shipments (dollars)[d]	.....	$2,083,919	$1,776,784	$15,487,337	.....
Steel boiler orders (sq. ft.)[d]	.....	661,372	968,743	8,870,038	.....
Locomotive orders (number)[m]	0	8	22	180	278
Freight car orders (number)[m]	21	1,195	1,310	38,664	47,826
Machine tool index[n]	152.0	210.7	136.5	†127.5	†180.8
Foundry equipment index[o]	185.2	231.8	173.8	†160.4	224.6
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	37,071	64,509	552,275	.....
Imports of pig iron (gross tons)[p]	.....	7,911	7,264	144,871	.....
Imports of all rolled steel (gross tons)[p]	.....	13,796	29,730	229,970	.....
Total iron and steel exports (gross tons)[p]	.....	542,740	261,882	2,714,817	.....
Exports of all rolled steel (gross tons)[p]	.....	213,990	132,434	922,435	.....
Exports of finished steel (gross tons)[p]	.....	173,902	110,886	826,970	.....
Exports of scrap (gross tons)[p]	.....	252,713	119,568	1,704,723	.....
British Production:					
British pig iron production (gross tons)[r]	769,600	726,600	670,300	6,367,100	6,929,100
British steel ingot production (gross tons)[r]	1,133,600	1,163,000	1,060,500	9,679,500	10,681,900
Non-Ferrous Metals:					
Lead production (net tons)[s]	49,197	41,046	42,156	372,271	436,838
Lead shipments (net tons)[s]	39,292	53,850	59,210	411,016	508,060
Zinc production (net tons)[t]	52,645	50,027	46,225	430,556	488 752
Zinc shipments (net tons)[t]	40,345	47,737	53,963	445,570	507,890
Deliveries of tin (gross tons)[v]	8,210	8,245	6,005	61,730	73,450
Copper production, refined (net tons)[w]	86,811	90,982	72,895	601,125	827,704

†Three months' average. *Preliminary.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary from Automobile Manufacturers Association—Final figures from Bureau of Census. [l] F. W. Dodge Corp.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange; [w] Copper Institute.



The Iron Age Weekly Index of Capital Goods Activity

(1925-27 = 100)

Last week	61.6	Same week 1934	43.1
Preceding week	68.0*	Same week 1933	47.1
Same week last month	82.5	Same week 1932	35.7
Same week 1936	89.0	Same week 1931	50.8
Same week 1935	69.6	Same week 1930	72.5
* Revised.		Same week 1929	103.4

WITH every component giving ground, THE IRON AGE seasonally adjusted index of capital goods activity lost 6.4 points for the week ended Nov. 20, and now stands at 61.6 per cent of the 1925-27 average. The weighted losses for the week were as follows: forest products, 9.9 points; steel ingot, 6.9 points; Pittsburgh area, 4.4 points, and construction awards, 0.2 points. A revision in Ward's estimated automobile assemblies for the week of Nov. 13 brought the figure for that week down to 83,325 units from the published figure of 85,325 units. The declines of the past 10 weeks have been particularly sharp because in most cases the losses were against the normally rising trend. However, the seasonal trend of most of the components of the index reached the turning point this week, and until the end of January slight declines each week are indicated. This should result in a noticeable leveling out of the index line inasmuch as unit losses will now be adjusted against a falling rather than a rising trend.

	Latest Week	Change from Preceding Week
Steel production (per cent of capacity)	35.0	—6.0
Automobile production (number of cars and trucks)	85,757	+2,432
Railroad loadings of forest products (number of cars)	27,507	—4,981
Pittsburgh industrial production and shipments (index number)	67.3	—4.4
Construction contracts awarded (total value)	$34,753,000	—$1,167,000

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

THIS WEEK ON THE ASSEMBLY LINE

. . . Auto output for year to fall short of 5,000,000 mark.

o o o

. . . Sales scene has bright spots with October 16.59 per cent higher than year ago.

o o o

. . . Fisher strike at Pontiac is open revolt against UAW leadership.

o o o

. . . Million dollar chlorine plant planned at Wyandotte.

DETROIT, Nov. 22. — Take it for granted that there is less confusion in the Auto Capitol than appears from your daily newspaper. Its stories of falling production and strike-ridden plants are sometimes confusing because they fail to present the whole picture, to tell what goes on behind the scene or weigh the attitudes of the men who are in control. Daily you read that production is being slashed, or is ready to bounce up sharply; that Ford is all ready to close down, or just ready to "let go" with a heavy schedule; that pent-up steel orders will flow freely soon, but that car producers are only slowly eating up huge piles of sheets left over from last year's models.

But let's just accept the assumption that tycoons of this business are like the leaders in any other field. Mostly they are marking time. Production is gaged closely to sales, too closely to be raced while sales are slow, too closely to be "bounced" because November sales show a moderate upswing.

As for the Ford company, it is not yet in volume production, but will probably approach top levels during December. First of all, it looks now as though Ford has conquered the fabrication problems that followed last minute changes in styling. But more important, dealers are getting anxious to be stocked, even though the 1937 stocks are still uncomfortably large in some sectors. This alone means an output of approximately 100,000 units, most of which will come in December since the greatest weekly output so far has been only about one-fifth of capacity.

Fortunately, the picture should brighten soon for steel. Orders have been light, but all buying in the automobile industry has been curtailed, inventories reduced, to fit the jig-saw pattern of sales, strikes, slump and scares-in-general. Steel buying will follow the automobile sales curve, and that now shows moderate strength.

1937 Output to Fall Below 5,000,000 Cars

The industry has had to readjust itself to lesser expectations than a year ago. Ward's Automotive Reports predicted late last week that the industry probably would not this year surmount the proud pinnacle it felt certain it could take in stride. Production will not reach the 5,000,000 units so easily predicted for 1937, but will fall a few thousand under because of the disappointing contraction in activity this month and the possibility that December may be hit by strikes and further recession.

Despite the setback, this year's volume will be the second best in the history of the industry, next to 1929. Last year's total was only 4,616,837, and it still seems likely to Ward's observers that the 1937 round-up of assembly line output in the United States and Canada will be about 375,000 above that. It means an increase of about 8 per cent over 1936. For next year—well, two who matched guesses recently found agreement in everything but choice of words to express it. One said "three-and-a-half millions." The other offered "70 per cent of 1937 production."

Some manufacturers find sales better than their competitors. In

most cases this is because the product has a few more attractive things this fall, or because the car really stands out as something new. Although a small factor, Graham is an example. It is now gradually speeding production operations in the face of a heavy bank of orders. New passenger car sales in October in 37 States ran 16.59 per cent higher than the same number of States in October, 1936, according to the latest registration report of the R. L. Polk & Co. Deliveries of Packards to purchasers in the first 10 days of November exceeded those for the first 10 days of October by 10 per cent and are ahead of last November. December production will be an increase over November. Customer deliveries of Cadillacs and LaSalles in the first 10 days showed an increase of 86 per cent over a year ago. Buick last week reported an October record 77 per cent better than last year's. Cars which have had few changes and those sold mainly to wage earners in the lower income group have made no such reports, probably a reasonable indication that public acceptance is not so good.

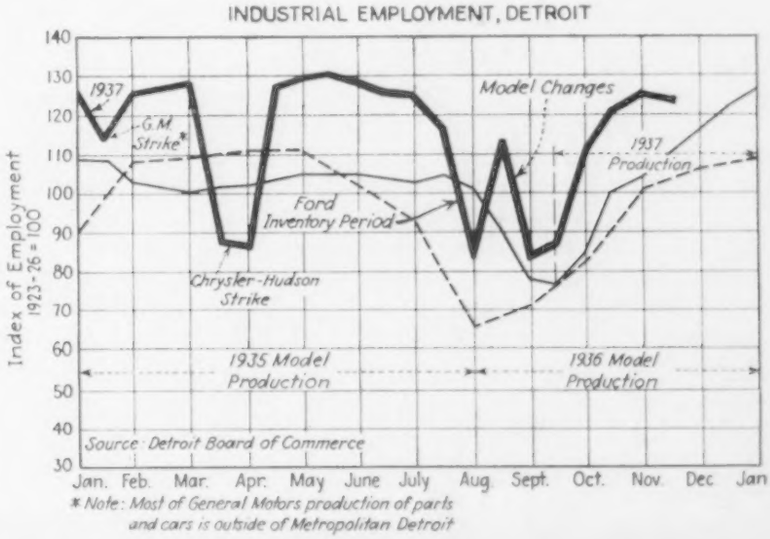
Automobile show attendance in Chicago and Detroit was gratifying. At the Illinois exhibit, 345,000 persons were present this year, compared with 318,000 last year. Detroit closed its show on Sundays (conforming to a recently established dealer practice) but still drew 141,150 customers, a loss of only 18,049 from last year.

The net result of generally more spontaneous sales reactions in the last few weeks has been to step up production slightly in some plants. Chrysler (back on a five-day week) is an example. That is why the total production last week gained, despite some strike delays. Output last week reached 85,757, compared with 83,325 (revised) the previous week and 116,126 last year, according to Ward's Reports. The gain is a cheering sign, and the figure is a good one, considering that Ford is still out of the picture.

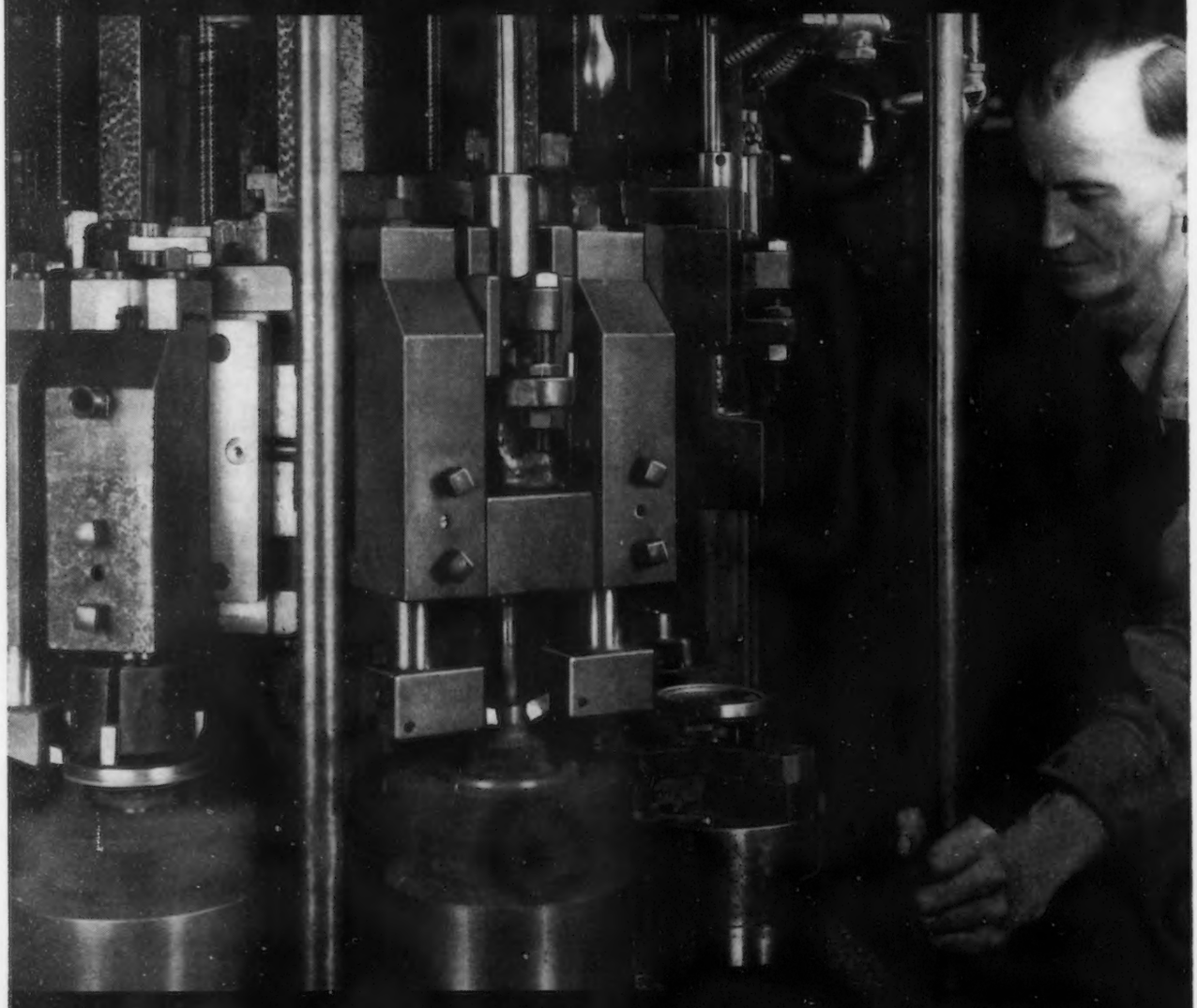
Strikes Break Out Again

As predicted here two weeks ago, wildcat strikes have broken out again in Michigan. CIO officers were able to curb unrest while the election campaign was on, but now find themselves unable to keep control. The Fisher Body strike at Pontiac is a prime example. Spokesmen for the rank and file made four demands while 15,000 workers were idle Friday night after the strike really got under way. First, that the corporation remove E. R. Leeder as manager of the Fisher Body plant in Pontiac; second, that the speed of production lines be reduced; third, that the plant reemploy 1350 workers recently laid off and abandon decentralization plans calling for shifting of some body work from Pontiac to New Jersey; fourth, that the corporation reinstate 12 men dismissed allegedly for union activity since March, 1936.

Probably only two of these points are significant. The first,



HERE'S NEWS



FOR the medium quantity runs, Bullard Mult-Au-Matics with standard type of tooling set high standards of Versatility and Effective Savings.

Just for instance . . . Here's an installation on which the user runs separately 9 different designs of work, each design having a run of approximately 6,000 pieces.

Times on the 9 different set-ups range from the shortest time of 13 seconds to 47 seconds the longest time.

Previous to this Mult-Au-Matic installation, several other machines did not adequately care for the production volume.

Now . . . Type "J" Mult-Au-Matic has replaced the several machines previously used for the 9 different jobs, and additional work is already being scheduled for this one machine.

Therefore, we say, "If Others can Profit by the Mult-Au-Matic Method, so can You". Ask Bullard Engineers to outline the Mult-Au-Matic possibilities on your work, and we suggest that you send in prints or samples for time and cost estimates.

Bridgeport THE BULLARD COMPANY Connecticut

involving the manager, is involved directly with the third and most important of the points. It may be summed up by saying that after the 15,000 workers saw approximately 10 per cent laid off, rumors about the decentralization plans ran riot all over the plant. Fear of losing jobs, fear of a hard winter ahead and a growing distrust of tactics formulated by officers of the international union are the real factors behind this strike. Today the rank and file is suddenly in command of the union.

The revolt started months ago, was trampled underfoot at the Milwaukee convention and won its first battle last week when Homer Martin tried to present a new GM contract to delegates at Detroit. Faced by a rebellious Flint faction led by Roy Reuther, he tried to get into line with the delegates' opinions and came out of the meeting having made a complete about-face on the contract which he himself had negotiated with the corporation. Apparently a week ago the union leadership faced a crisis and has only partly fitted itself in with the belligerent attitude that the rank and file has taken. Perhaps it means that with dues hard to collect and Martin attempting to put pressure on officers of the local unions, the tables have suddenly been turned and he is fighting to maintain his place at the head of the UAW.

Plants within the City of Detroit have been operating with nearly full staffs, although the four-day week has been general. The result is that Detroit's employment index as of Nov. 15 is still near the peak. However, it is a volume indicator showing the number employed, not the work hours for that period. As shown on the accompanying chart, there was a slight drop from 124.9 the first of the month to 123.4. A year ago the index was only at 112.6. In fact, this is the highest November employment index recorded by the Board of Commerce, the 1929 point being only 89.5. The depression low in 1932 was 40.8. Reduction in the work week is reflected in the power consumption figures for Detroit, which are down to 27,000,000 kw. hr. from 30,000,000 kw. hr. the previous week. The welfare load increased slightly from 14,789 to 14,904. Building permits, consistently below last year's level, were cut in half in one week's drop from $919,000 to $462,000.

While decentralizing moves are highly publicized, Detroit finds itself housing one more group of automotive executives. Transfer of four departments of the Nash Motors division of the Nash-Kelvinator Corp. from Kenosha, Wis., to Detroit is under way. Harold Long, vice-president in charge of purchases, is already set up in the executive offices of the Kelvinator plant. Before Jan. 1 three other offices, sales, statistics and advertising, will be located there, according to C. H. Bliss, vice-president and sales director. He explains the changes as an economy measure, in no way affecting the concentration of Nash manufacturing at Kenosha. The move will bring to Detroit, besides Mr. Bliss and Mr. Long, Courtney Johnson, general sales manager, A. R. Boscow, advertising director, F. C. Williams, his assistant, E. J. Reeser, sales promotion manager. Three others who now will become familiar figures in this automotive center are Karel Rickerson, Fred Shaw and John Stoehrer, advertising men who look after Nash interests.

New Plant for Michigan Alkali

A new electrical process of producing caustic soda and chlorine will be put in use soon by Michigan Alkali Co. in a million dollar plant at Wyandotte, Mich. With new types of equipment the company is planning to produce the caustic soda and chlorine under an English process, for which rights were purchased recently from Imperial Chemical Industries of England. It will be the only producing plant of its kind in the United States.

Under this English process, the new plant will use mercury cells which will produce about 100 tons of chlorine gas and 120 tons of caustic soda daily. The Wyandotte concern has been using the lime-soda process for the production of its caustic soda. It is said that the caustic soda produced by the new method is about five times as concentrated as that produced by the electrolytic methods employed generally in the United States.

Officials said that they considered locating the new unit in the South within the reach of TVA energy. All the advantages and disadvantages were carefully checked. Because they deemed it to their advantage to keep the new plant at home where they would be closer in touch with it, it was decided that the first unit of the plant should be located in Wyandotte. Other units will be added, they said.

Preliminary plans for the new structure have been completed and construction will be started as soon as details are worked out, with the company doing its own construction work and installing its own equipment and power generating plant.

STEEL bodies statically tested show amazing strength. This sedan structure withstood more than twelve tons of sand load, nearly seven times its own weight, before it collapsed. The test was staged as a demonstration by Studebaker engineers. Inset is a scoreboard which shows the exact load, 24,750 lb.

WASHINGTON. . . . . .

. . . Immediate steps to curb price increases believed likely following President's order that FTC investigate living costs.

o o o

. . . New trade agreement between United States and Britain may include cut in duty on tin plate, coal, textiles, other commodities.

o o o

. . . ICC finds freight burden totals only 8.47 per cent of commodities value last year in study of railroad rates.

o o o

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

WASHINGTON, Nov. 23.—Following his warning to Congress that a rapid rise in prices was threatening in particular "the anticipated revival of building," President Roosevelt has directed the Federal Trade Commission to investigate at once the rise in living costs and the part played in this rise by socalled monopolistic practices and other methods which allegedly interfere with free competition.

Significantly, Attorney General Cummings earlier in the week stepped into the limelight for the second time within a month on what the New Deal promises in the way of a rigorous trust-busting campaign and disclosed that he has asked the Budget Bureau for $1,000,000 additional during the next fiscal year to war against industrial monopoly.

Blames Monopolies

In a letter to W. A. Ayres, FTC chairman, the President said:

"My attention has been directed to reports of a marked increase in the cost of living during the present year, as compared with recent years past, attributable in part to monopolistic practice and other unwholesome methods of competition.

"I believe it to be important to know the facts touching this situation and, therefore, request the Federal Trade Commission to make an immediate investigation into such alleged practices and methods and report to me as early as practicable.

"I understand such inquiry can be made without any increase in your current appropriation."

Quick Steps Seen

Since Mr. Roosevelt asked for completion of the study "as early as practicable," it appeared likely to most observers that he contemplated immediate steps to curb price increases although no one in Administration circles is disposed to say what form these steps may take. The President indicated at a recent press conference that the problem was under study in connection with the Administration's tentative plans to stimulate a private large-scale construction and housing program, but declined to elaborate on his remarks.

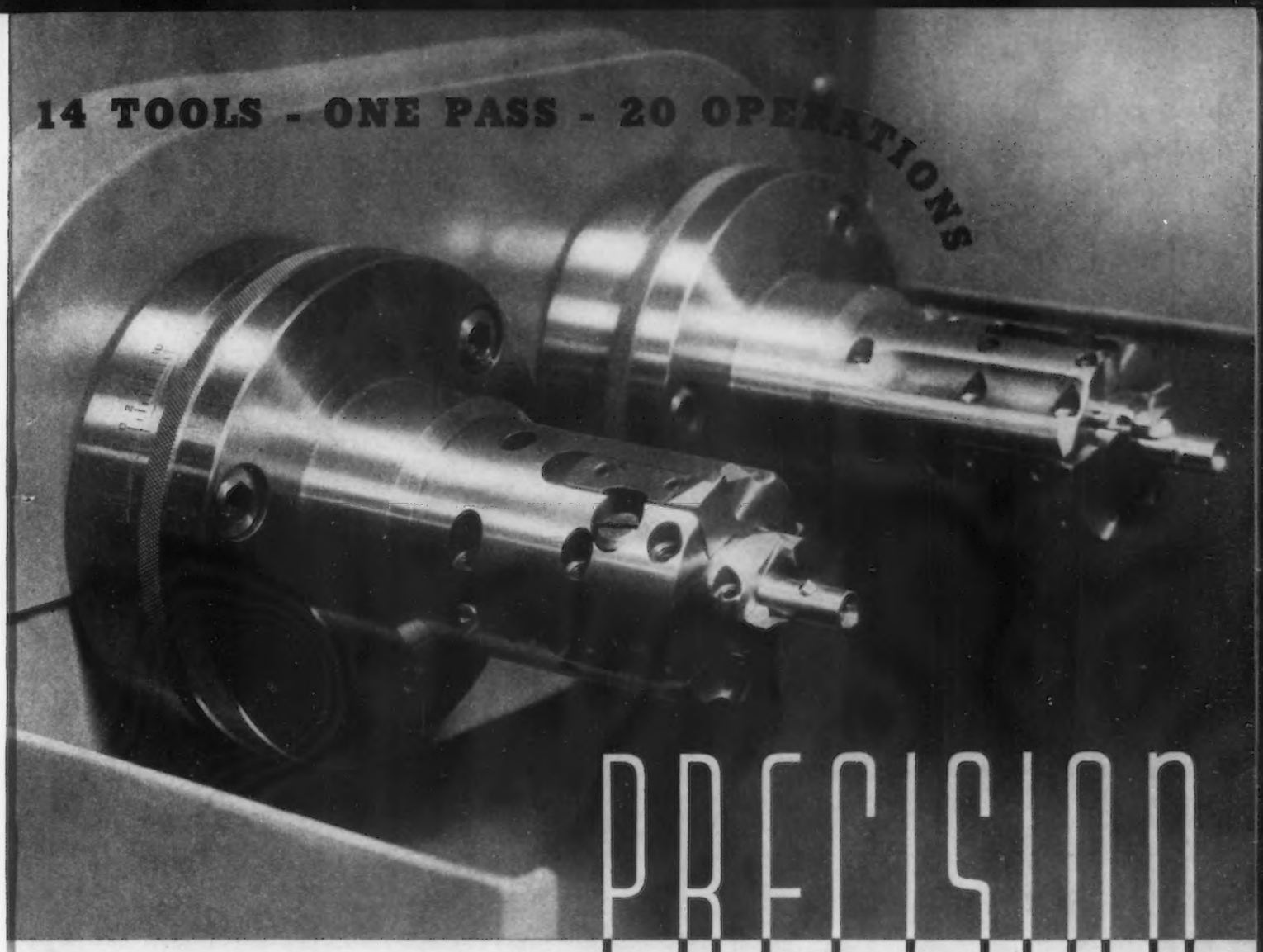
The belief persists in Washington, too, that the President plans to link the FTC findings with the suggested plan of the Attorney General for sweeping revision of the anti-trust statutes. Cummings recommended last April that a committee be named to study anti-trust revision, but the President, although hinting in several of his speeches that the Administration planned to check "the growing concentration of economic control," remained unpredictable and has not expressed himself on the Cummings suggestion.

No. 1 On His List

Less than half the amount asked by the Attorney General for expanding the facilities of the anti-trust division of his department is now appropriated annually.

Cummings, who less than two months ago followed in the footsteps of other key Administration spokesmen by denouncing identical and so-called collusive bidding, characterized the anti-trust problem as "No. 1 on my list of things to be done." The so-called collusive bids related to steel and other products and were attributed largely to use of the basing point system in quoting prices.

"We need more funds and more men, as these cases are most complicated and take an enormous amount of time," he said. "I've



BRISTLING WITH PRECISION

TAKE another look at the above illustration . . . when these boring quills start spinning, 14 tools flick into action. With each pass 20 operations are performed. That means a lot of surfaces finished at a crack, — each to the same high degree of precision, and we might add, because these quills are part of a Heald Bore-Matic.

Although these quills seem to bristle with tools each has its specific function designed to fill the customers' needs. In this case the use of multi-tool quills enable many concentric surfaces in aluminum housings to be finished with absolute concentricity and alignment.

Perhaps you have a job involving concentric surfaces like this one. Or maybe it's just a plain hole. In any case, whether it's boring, or turning, facing, milling, you can expect maximum cutting efficiency if you use a Heald Bore-Matic — because they are custom tooled for every job. And you'll do the job with greater precision — at less cost.

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been preaching until I'm almost tired of hearing my voice that the anti-trust situation is a very important problem."

He revealed that his aides, headed by Assistant Att'y.-Gen. Robert H. Jackson, are preparing data for Congressional consideration in an effort to impress the law-making bodies with the necessity of overhauling and extending the present laws against monopolistic practices. There is little likelihood, however, that any anti-trust legislation will be enacted at the present special session.

Ten Cases A Year

If the Justice Department receives Budget Bureau approval for an additional million dollars next fiscal year, it will permit an increase in the anti-trust division's legal staff and defray the cost of activities involving anti-trust action. It is understood a major anti-trust prosecution, such as the pending case against the Aluminum Co. of America, is estimated to cost the Government about $100,000 a year. On that basis, the Attorney-General anticipates the increased appropriation requested would permit the department to prosecute at least 10 major cases a year.

The Presidential broadside against prices is, in large part, a resurrection of previous attacks he has made on prices of socalled durable goods in which he specifically mentioned steel, cement and copper. Also in mind are prices of foodstuffs, thus comprehending an exhaustive survey on prices. Gravely concerned over the recession in business, the administration thus takes a typical turn in seeking to lay the blame at the door of industry and business, while utterly ignoring administration responsibility by its policies of governmental regimentation, unbridled expenditures and the inevitably sharp rise in taxes, and labor costs.

New Price Attack Seen

The fact that the FTC is not to be provided with additional appropriations to make the study, which no doubt will be of the character desired by the President, will not prevent it from engaging in a foray against prices of steel, cement, and other building materials. For already the FTC has exhaustive data on what it calls monopolistic practices. It is to be expected that they will be pointed to as the outstanding obstacle in reviving a building program as now being urged upon private capital by the administration in connection with housing and industrial construction. Wages in all likelihood will be given scant, if any consideration, in the forthcoming FTC report.

The commission has indicated that the data in its files can be quickly brought up to date without increased expenditures. Included in the data is elaborate material on the multiple basing point system of the iron and steel industry, which has been roundly assailed by the FTC. The FTC has recommended abolition of the basing point system entirely and the substitution of an f.o.b. mill basis of quotation. It has disregarded entirely arguments of the steel industry to prove that the system is not practical and that the present system decidedly is built upon a competitive basis.

The FTC has scheduled Dec. 1 for the beginning of hearings on its complaint directed against the multiple basing point system as practiced by the cement industry. It also has a complaint directed against the Birmingham-plus system used by the cast iron pipe industry. These cases are known to be attacks on the basing point system as used by all industries of the countries and a drive to force them to a system of f.o.b. mill quotation. The Wheeler bill has the same objective and is actively supported by the FTC. The bill is before the Senate Committee on Interstate Commerce, but has not as yet been revived for action by Senator Wheeler, chairman of the Committee on Interstate Commerce.

New Favor Seen

The President's demand for an FTC investigation, however, has raised the question as to whether it is not the purpose to attack the basing point system through a FTC cease and desist order rather than by later legislation, though with the prospect that the latter will seek to bar the basing point system of quoting prices.

Those who doubt that an early FTC cease and desist order may be expected point out that it hardly would make such a move while hearings on the cement and cast iron soil pipe basing point cases are under way. They believe instead that the attack will be by way of legislation and direct attention to the fact that the FTC has said that it believes it can have a report ready for the President early next year, indicating legislation would be drafted and introduced shortly after the regular session of Congress convenes. There are also reports that the legislation will make necessary re-

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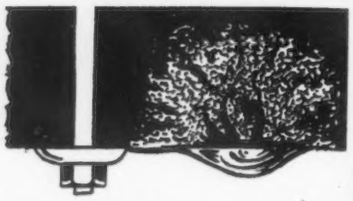

THOSE LEAKS

WITH ONE PIECE—SEAMLESS JOINTLESS—MOLDED PLASTIC

HAVEG TANKS

Unaffected by acids commonly used in pickling. Unaffected by rapid temperature changes. Tough and durable. Can be used at continuous operating temperatures up to 265°F.

Standard rectangular tanks made with dimensions in multiples of 6″—one piece—up to 9′6″ long, 6′ wide, 6′ deep or up to 13′ long, with proportionate reductions in cross sectional dimensions. Also standard pipe and fittings.

HAVEG CORP., NEWARK, DEL.

peal of the Tydings-Miller resale price maintenance law.

At a meeting last Saturday, the FTC announced that it would undertake the President's requested inquiry at once and report its findings to him "as early as practicable." A resolution which the commission adopted was that a section of the FTC organic act granted authority to conduct the inquiry. The commission decided to call experts to submit a plan of procedure, covering both the economic and legal phases, together with the scope, of the investigation.

U. S. Seen Meeting Own Manganese Demands

WASHINGTON, Nov. 23.—Investigations of an electrolytic method of recovering pure metallic manganese indicate that this country may be able to produce all of its requirements of that important metal, says Dr. John W. Finch, director of the Bureau of Mines, in his annual report. Methods have also been developed for concentrating western chromite ores.

The treatment of pegmatite tin ores is another metallurgical project that, if successful, may make it possible for the United States to produce at least a small part of its tin supplies now obtained from foreign countries. These studies are being made in connection with the bureau's continued research of methods for making the United States self-sufficient in strategic minerals, particularly those of importance in warfare.

Navy to Open Bids on Chromium Ore Jan. 4

WASHINGTON, Nov. 19.—The Bureau of Supplies and Accounts, Navy Department, will open bids Jan. 4 for 3,000,000 to 4,000,000 lb. of 48 per cent chromium ore for stock to be delivered to the Philadelphia Navy Yard within 120 days. The ore, for manufacture of ferro-chromium, is to be in lumps which shall pass a 6-in. screen and not more than 10 per cent shall pass a ½-in. mesh sieve.

Pittsburgh Coke & Iron Co. preferred stockholders have authorized the issue in 1937 of not exceeding 7500 shares of preferred stock as a dividend on the common stock at the discretion of directors. However, holders of the company's 10-year debentures, because of the recent security market decline, have not yet lifted restrictions on payment of dividends on the common stock.

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Hull Seeks Suggestions On Proposed Trade Pact Items

WASHINGTON, Nov. 23. — Hailed as having broad political and economic potentialities, the contemplated trade agreement between the United States and United Kingdom, is expected to cover changes in rates on a wide range of products.

Secretary of State Cordell Hull has emphasized that so far there has been no commitment by either government and announced that during the next four weeks suggestions will be received concerning different commodities that might be considered. Hearings will be followed by negotiations which can hardly be completed in less than six months.

Announcements of the contemplated American-United Kingdom trade agreement were made simultaneously last Thursday by Secretary Hull in Washington and Prime Minister Neville Chamberlain in the British House of Commons.

New Pact With Canada

A few hours later Secretary Hull announced that a new reciprocal trade agreement will be negotiated with Canada, supplementing the present one negotiated Nov. 15, 1935, to run for a three-year period. The proposed American-Canadian agreement will be restricted and is designed to be in accord with the American-United Kingdom agreement. The United Kingdom is the largest and Canada second largest foreign market for the United States.

It is reported that American concessions to Britain will relate to manufactured lines chiefly and that there is a possibility one relates to tin plate, though officials frown on any speculation. The present duty on tin plate is 1c. per pound and imports are negligible. Should the duty be cut, it obviously would be done on behalf of Welsh tin plate manufacturers.

Other Concessions Possible

Other reported American concessions that might be made include rates on anthracite coal, textiles, leather goods, woolens, cotton manufactured materials, linoleum flax manufactures, together with extension of the present temporarily reduced rates on liquor. Prospective British concessions are said to relate to agricultural products, such as cereals, corn, bacon, raisins, dried fruits, lumber and lard.

Since both the United Kingdom and the United States compete in the export markets in iron and steel and buy but little of the standard commercial products from each other, extensive rate concessions in these lines are reasoned improbable. Moreover, the rate structure in the Hawley-Smoot iron and steel tariff schedule has been rather broadly tapped under reciprocal trade agreements previously negotiated and reductions granted in them of course apply to the United Kingdom and all other countries with which the United States has most-favored-nation treaties.

Alloy Duty Cut Seen

Concessions might be granted the United States on special alloys and tool steel not competitive with the United Kingdom or her dominions. The United Kingdom of course will have to consider its dominions as well as itself. It is possible that concessions might be granted on certain types of American metal-working machinery which the United Kingdom does not make.

At present United Kingdom purchases of American iron and steel machinery are and for more than a year have been abnormally high. This is due to the heavy building and industrial expansion in England as well as to its rearmament program which have not only engaged England's iron and steel and related industries at full capacity but made necessary abnormally large imports from the United States and other countries. Once these activities let down a return to old conditions of light trade is expected.

British Imports Rise

The sharp rise in British imports of American iron and steel, exclusive of scrap, is shown by the record movement of 228,428 gross tons in the first nine months of 1937 as compared with only 10,548 tons in the corresponding period of last year. In the January-September period of the current year the United Kingdom took 9 per cent of all foreign shipments of American iron and steel as against only 1.3 per cent in the 1936 nine-month period.

The 1937 shipments of iron and steel to the United Kingdom consisted principally of pig iron, 191,457 tons; ingots, 5967 tons; steel bars, 9567 tons; and hot and cold rolled strip steel, 6449 tons. Other conspicuous products of 52 steel items shipped to the United Kingdom were wire rods, sheets, and railroad track material, with some rails. American scrap exports to England have increased abruptly and for the first nine months of 1937 aggregated 627,728 tons.

U. S. Imports Negligible

American imports of British steel, except for certain specialties, are almost negligible.

Outstanding in interest in connection with the contemplated American-United Kingdom negotiation is the treatment that may be given the so-called British empire preferential rates. Applicable only to Great Britain and her dominions, this preference is said to have been the center of discussions leading up to plans for negotiating an agreement.

Secretary Hull said the object of the preliminary announcement regarding the proposed agreement with the United Kingdom is to provide notification at the earliest date in order that interested parties may have an opportunity to suggest the import or export products, which, in their opinion, should be included in the negotiations. Continuing, Secretary Hull said:

"Such suggestions, particularly those in regard to export products, are most useful to the trade-agreements organization if available at an early stage. Full information should be submitted as soon as possible. Exact technical descriptions of the products in question should be given, including, so far as possible, their nomenclature in the tariff laws of the importing country.

"These suggestions may be submitted in any form, and need not be under oath. They should be addressed to the Chairman of the Committee for Reciprocity Information, 7th & F Streets, N. W., Washington, D. C., and should reach the committee not later than Dec. 16, 1937.

Mine Bureau Offers Oxyacetylene Film

"MODERN Metal-working with the Oxyacetylene Flame," a new two-reel silent motion picture film depicting construction and operation of the oxyacetylene torch and the oxyacetylene process for joining and severing metals may be obtained by business organizations and others from the Bureau of Mines Experimental Station, 4800 Forbes Street, Pittsburgh.

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SUN OIL COMPANY – PHILADELPHIA, PA.

Shipping Cost 8.47 Per Cent of 1937 Commodity Value, ICC Says

WASHINGTON, Nov. 23.—The total railroad freight burden was only 8.47 per cent of the total value of commodities carried in 1936, according to the Bureau of Statistics, Interstate Commerce Commission.

The ICC estimated the total value of the commodities at $40,480,000,000 with freight charges of $3,430,000,000. Corresponding figures for 1933 were $24,200,000,000 in total value, and $2,580,000,000 in freight charges, the percentage relation being 10.66. For 1930 the value was $63,090,000,000 and freight revenue was $4,210,000,000, a ratio of 6.67 per cent.

In steel, rated fifth class in official territory, covering the bulk of finished production, the 1936 aggregate destination value was $1,652,417,000 and the freight revenue percentage was 7.59. The steel in this classification which was carried totaled 26,824,955 net tons, the total freight revenue was $125,479,000 and the average freight revenue per ton was $4.68. The value per ton at point of production was $56.92.

Cost of Steel Shipments

In iron and steel rated sixth class in official territory the destination value was $120,545,000, or $21.85 per ton while the freight revenue ratio was 6.43. The quantity carried was 5,516,916 tons, the aggregate freight revenue was $7,747,000 and the average rate per ton was $1.40. In pig iron the total destination value was $92,603,000, the destination value was $18.89 per ton and the freight revenue ratio was 10.97. The quantity carried was 4,902,223 tons, the aggregate freight revenue was $10,162,000 and the average rate per ton was $2.07.

Iron and steel pipe and fittings had a destination value of $418,081,000, or $109.60 per ton, the freight revenue ratio being 7.65 per cent. The aggregate freight revenue on the 3,814,613 tons carried was $31,994,000 or an average of $8.39 per ton.

Rail Steel Figures

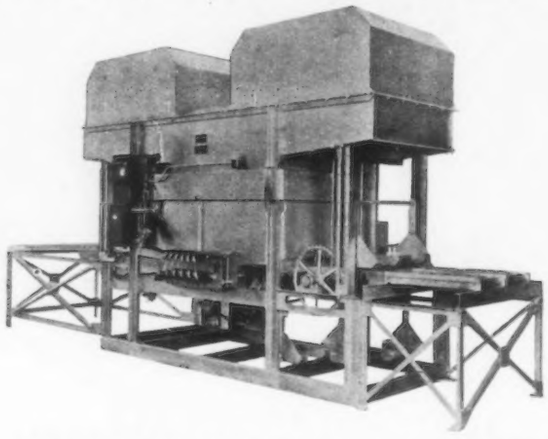
The destination value of the 1,421,609 tons of rails, fastenings, frogs and switches carried was $115,136,000. The destination value was $80.99 per ton and the freight revenue percentage was 3.54. The aggregate freight revenue was $4,081,000 and the average rate per ton was $2.87.

The nail and wire (not woven) volume carried was 1,583,383 tons, the aggregate destination value was $92,850,000, and the destination value a ton was $10.56. The aggregate freight revenue was $9,807,000 and the average rate a ton was $6.19.

Most of the iron and steel prices in the study were taken from THE IRON AGE.

The report said the figures do not show nor are they intended to show whether freight rates are too high or low. Nevertheless, it was pointed out, that the ratios of freight revenue to the value of commodities do throw some light on the value of service, although they have no bearing on the cost of transportation service.

DETREX DEGREASERS



FOR PRODUCTION CLEANING AT LOWER COST

In comparing cleaning methods, look to quality and unit cost—and let proved performance point the way to your decision!

It will pay you to investigate the improved Detrex Solvent Degreasing Process. You will find, as have many others, that it is faster . . . safer . . . more flexible . . . more convenient . . . more economical. It is *the* industrial cleaning process that simplifies cleaning, increases production speed, lowers costs, and gives a better job.

From the complete line of Detrex Degreasers—ranging from small standard models to large, conveyorized machines—you can choose the unit to meet your cleaning requirements. Our engineers will gladly assist you in your cleaning problems.

Write for complete information, and booklet—
Scientific Metal Cleaning.

DETROIT REX PRODUCTS COMPANY

Metal Cleaning Engineers—Solvent Degreasing—and Alkali Cleaning

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New York Office: 130 W. 42nd St. Chicago Office: 201 N. Wells St.

Cleveland Office: 812 Huron Road. Cincinnati Office: Provident Bank Bldg

..PERSONALS..

MURRAY B. WILSON has been named manager of the New York sales district of the American Rolling Mill Co., Middletown, Ohio,

MURRAY B. WILSON

succeeding CLIFF SPEAR, who has been forced to curtail his activities because of ill health. Mr. Wilson started in the Middletown plant of the company in 1923 as a mill worker, following his graduation from Miami University, Oxford, Ohio. He was later assigned to the home office sales division. Since 1927, he has been attached to the Detroit sales district office.

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JOHN F. MILLER has been elected chairman of the board of Pittsburgh Screw & Bolt Corp., Pittsburgh. He is also vice-chairman of Westinghouse Air Brake Co. Mr. Miller succeeds the late William G. Costin as chairman of the board of Pittsburgh Screw & Bolt. JOHN M. YAHRES was made executive vice-president, and JOHN M. AUTY, treasurer.

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D. T. DOWNES has been appointed development engineer for the Pittsburgh Plate Glass Co. at the recently organized central development laboratory. He resigned as chief engineer of the Calorizing Co., Wilkinsburg, Pa., to accept this position.

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WILLIAM P. DIXON, until recently export manager of the Jones & Laughlin Steel Corp., has joined the New York Sales organization of the McKeesport Tin Plate Co.

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B. C. HEACOCK, president, Caterpillar Tractor Co., Peoria, Ill., has been nominated to succeed himself as president of the Illinois Manufacturers' Association. He will be the only nominee for that office. The election will be held Dec. 14, preceding the 40th annual dinner of the association at the Stevens Hotel, Chicago, at which the principal speaker will be TOM M. GIRDLER, chairman, Republic Steel Corp. and president, American Iron and Steel Institute. Other officers of the association who have been placed in nomination are as follows: First vice-president, J. C. BELDEN, Belden Mfg. Co., Chicago; second vice-president, J. E. OTIS, JR., Stewart-Warner Corp., Chicago; treasurer, PAUL SCHULZE, Paul Schulze Biscuit Co., Chicago.

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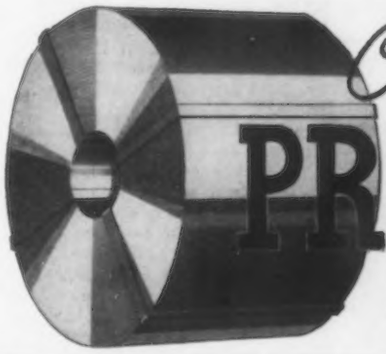
JOHN U. ANDERSON has been elected secretary and treasurer of

ON YOUR
STRIP STEEL ORDERS

● This phrase in the cold rolled strip steel business means uniform close accuracy to gauge over the complete width and length of the strip as regularly produced by Cold Metal's rolling processes. The truth is that our commercial practice achieves degrees of uniformity and accuracy far better than standard trade specifications. Even though no special tolerance is specified, Cold Rolled Precision Strip Steel is held to close limits and all users of our steel know that this extra quality is there. They benefit by it in many ways that fabricators thoroughly understand.

Specify any analysis and temper you require—specify gauges as light as .001" if you can use them—specify the largest coils you can handle—but leave the matter of gauge tolerance to us by simply including the phrase "C.M.P. Accuracy."

The Cold Metal Process Co.
YOUNGSTOWN, OHIO



Cold Rolled
PRECISION
STRIP STEEL

R. A. PETERSON

C. S. RAMSAY

S. R. STANIER

R. B. LUCAS

the Pittsburgh Steel Co., effective Dec. 1. Mr. Anderson is now associated with National Fireproofing Corp. as secretary and treasurer. Prior to this he was treasurer of Republic Steel Corp. HENRY J. MILLER, who was vice-president and secretary of Pittsburgh Steel and CHARLES E. BEESON, who was vice-president and treasurer, continue as vice-presidents of the company.

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G. A. TOMPSON, heretofore vice-president in charge of sales of the Bethlehem Supply Corp., Tulsa, Okla., subsidiary of Bethlehem Steel Corp., has been made executive vice-president and general manager of the supply company. He succeeds H. P. TRAUBMAN, who has resigned. Mr. Tompson has been engaged in the oil supply business for two decades in the Mid-Continent field.

W. C. FLANDERS, who has been identified for the past 15 years with the Worthington-Gamon Meter Co., Harrison, N. J., has been made sales manager, succeeding G. H. GLEESON, formerly vice-president in charge of sales, who has resigned. Mr. Flanders has been general representative in the Northeastern section for the past two years.

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DR. GEORGE B. WATERHOUSE, professor of metallurgical production at Massachusetts Institute of Technology and president of the American Society for Metals, has been awarded the honorary degree of Doctor of Metallurgy by the University of Sheffield, England.

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GEORGE A. BLACKMORE, JOHN S. CRAIG and LEON E. HICKMAN have been elected directors of the Pittsburgh Screw & Bolt Corp., Pittsburgh.

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GUSTAVE KLINKENSTEIN, vice-president and technical director of Maas & Waldstein Co., Newark, N. J., discussed "The Specialization of Finishes and Its Effect on the Work of the Electroplater" on Nov. 20 at a meeting of the Springfield, Mass., branch of the American Electroplaters' Society.

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HUGO KUROWSKE has been appointed sales manager of the Claude B. Schneible Co., Chicago. L. C. BEERS, formerly in the Southern territory, has been designated New England district manager, with headquarters at Springfield, Mass. CARL HERMAN, of Philadelphia, will be in charge of sales in the New Jersey and New York metropolitan area. NOYES C. FRENCH, Ohio representative at Cleveland, has taken over additional sales territory, including part of West Virginia and Kentucky. JOHN LISKOW has been appointed chief engineer, and CARL NODERER, has been made experimental engineer.

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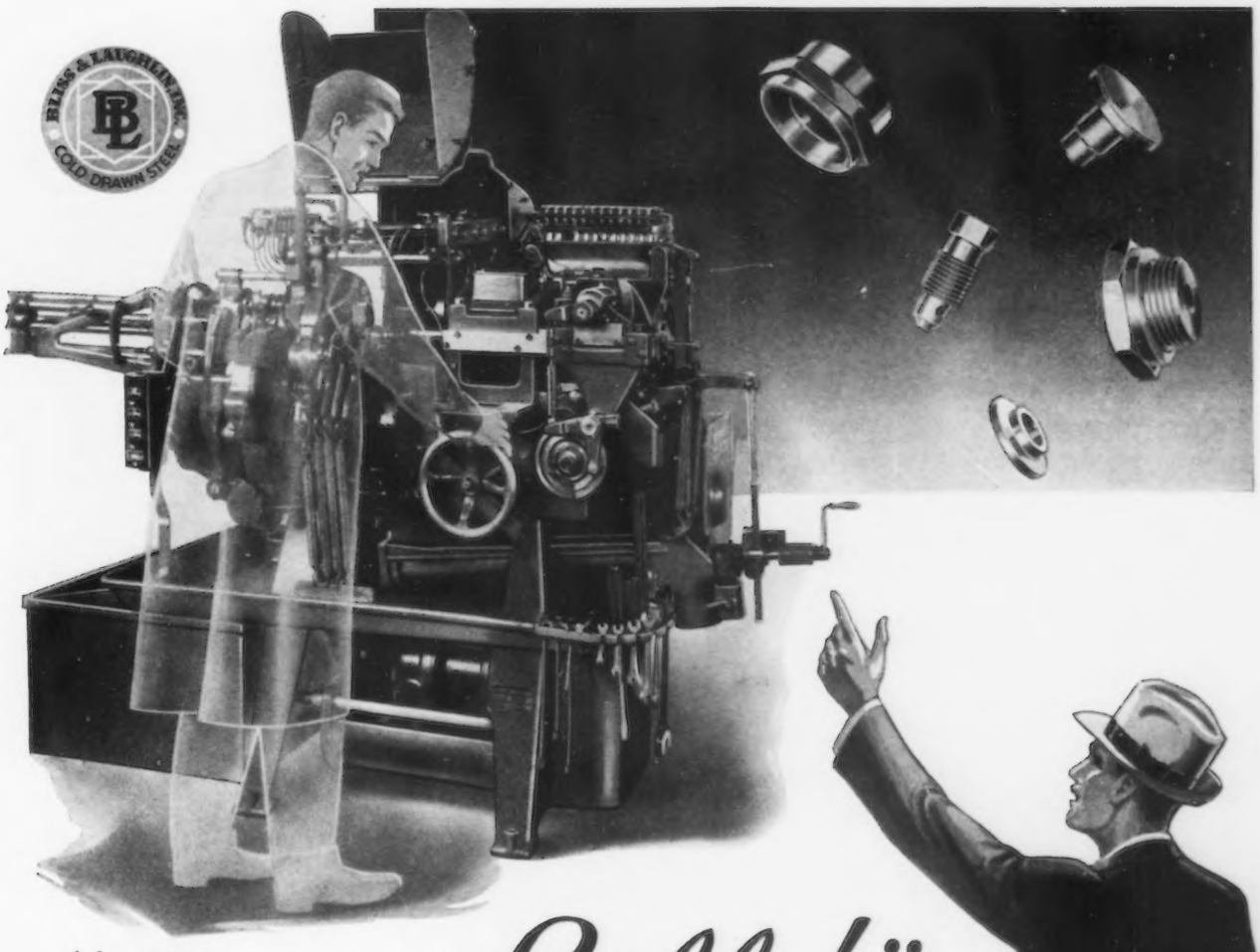
WALTER L. UPSON, professor of electrical engineering in Washington University, St. Louis, effective Jan. 1, will assume charge of research for the Torrington Mfg. Co., Torrington, Conn., giving special attention to fans and air impellers. He has been serving in the capacity of consulting engineer for this company for the past several years. Professor Upson is the holder of advanced degrees from Princeton and Harvard, and has also studied in the University of London. Early in his career he

G. TREE

S. L. MOFFATT

NEW Operating Personnel at Gary Works, Carnegie-Illinois Steel Corp. (Left to right): R. A. Peterson, superintendent of the merchant bar mills; C. S. Ramsay, assistant superintendent of the merchant bar mills; S. R. Stanier, superintendent of the hot strip mills; R. B. Lucas, superintendent of the wheel and axle mills; George Tree, superintendent of maintenance, west division; and S. L. Moffatt, superintendent of No. 4 open-hearth furnace. Biographical sketches appeared in these columns last week.



"Say, Bill!..."

"You have been telling me about that small ragged tip left on your machine parts after cut-off. I have taken that problem up with B & L Service Engineers, and here is a sketch they prepared showing a simple tool grind which will lick the problem for you."

* * * * *

Troubles like this are happening almost hourly in machine shops from coast to coast. That's where our field service men can help you. They are trained in the practical end of steel fabricating work, and are always ready to give suggestions on better machining methods.

Next time our representative drops into the plant, don't hesitate to tell him your problems. You will find him a "regular fellow"—just as anxious to get results from B & L machining steels as you are. If he can't answer your question direct, he will refer it to our technical department.

COLD DRAWN BARS
●
ULTRA-CUT STEEL
●
GROUND SHAFTING
●
ALLOY STEELS

BL BETTER MADE STEELS LABORATORY TESTED

Besides the subject of machines, tools, oils and tool grinds, there is the all-important question of what type screw stock is best for your job. There is a grade of B & L Cold Finished Screw Stock for every machine and every purpose:—

Ultra-Cut for maximum machinability
SAE 1112 for slower speed automatics
Open Hearth Steel for carburized parts
Special Screw Stock for special jobs

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

was associated with the late Dr. Elmer A. Sperry, and later he served for several years as assistant to the late Dr. C. P. Steinmetz, of General Electric Co.

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CHARLES A. RANDORF, who has represented the Northern Equipment Co., Erie, Pa., in the Buffalo area for the past 13 years, will also represent the company in the Rochester, N. Y., territory. He succeeds ALDEN L. COVILL, who is retiring from business after having represented the company since 1918

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CLARENCE WITTMER has been appointed national service manager for the Emerson Electric Mfg. Co., St. Louis, Mo., succeeding W. A. DEVLIN, who has resigned.

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HAROLD L. HOEFMAN, since 1935 manager of the Detroit warehouse and sales office of the Link-Belt Co., Chicago, has been made manager of the Atlanta, Ga., office, succeeding I. H. Barbee, who died on Nov. 4. GEORGE A. PAIGE, who has been district sales manager at Pittsburgh, is being transferred in a similar capacity to the Detroit territory, and is in turn being succeeded at Pittsburgh by LAURANCE O. MILLARD, who has been district sales manager at Cleveland. PAUL V. WHEELER becomes district sales manager at the latter office, where he has been stationed since 1921.

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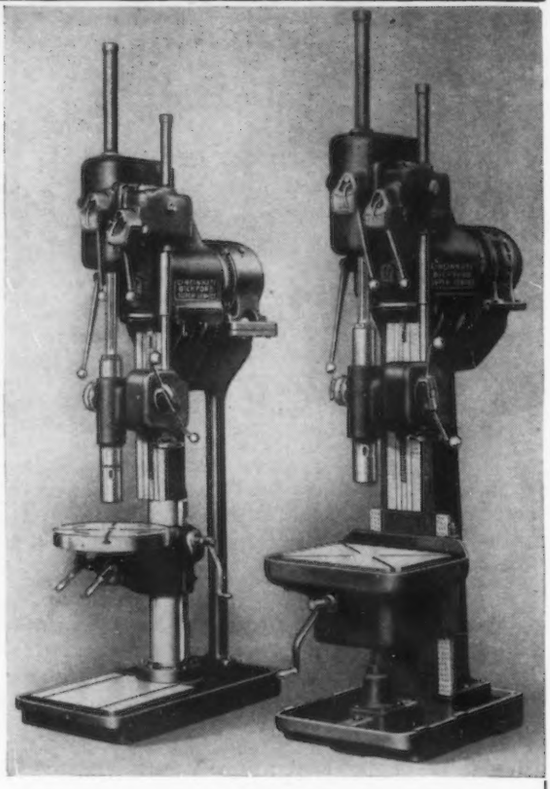
BEN KRAMER, of the Modell Iron & Metal Co., Detroit, has been elected president of the Michigan chapter of the Institute of Scrap Iron and Steel Co. EDWARD STEIN, associated with the United Iron & Metal Co., Canton, has been made president of the Cleveland chapter of the institute; HARRY J. KIENER, with Hickman, Williams & Co., St. Louis, becomes Institute head in that city, and HYMAN MOSKOWITZ, of Moskowitz Brothers, Cincinnati, has been elected president of the Cincinnati chapter.

All geared 21" 24" and 28"
SUPER SERVICE UPRIGHTS

Put more load on the Drill . . . less on the driller



Select a Super Service Upright and provide your men with an up-to-the-minute machine that does everything but think. Incorporated in Super Service Drills are ease of control, speed, accuracy and long life. Less effort is required of operators.

Driving motors are direct-connected; bearings are of ball or roller construction; gearing is heat treated alloy steel; table arm controls are at the front. And the net result, in terms of your work, is MORE HOLES PER DOLLAR.

THE CINCINNATI BICKFORD TOOL CO., Oakley, Cincinnati, Ohio, U.S.A.

CINCINNATI BICKFORD

COMING CONVENTIONS

Nov. 26 to 27—Northwestern New York foundry conference, Cornell University, Ithaca, N. Y. A. C. Davis of the university is chairman of the arrangements committee.

Dec. 1—American Standards Association, Astor Hotel, New York. Dana D. Barnum, 29 West 39th Street, New York, is president.

Dec. 6 to 10—Personnel Research Federation, Hotel New Yorker, New York. C. S. Slocombe, 29 West 39th Street, New York, director.

Dec. 6 to 11—Society for the Advancement of Management, Hotel New Yorker, New York. Headquarters of the society is at 29 West 39th Street, New York.

Dec. 6 to 11—Exposition of Chemical Industries, Grand Central Palace, New York.

Jan. 12 to 14—Institute of Scrap Iron and Steel, Ambassador Hotel, Atlantic City, N. J. B. H. Rubine, Hudson Iron & Metal Co., Bayonne, N. J., is in charge of arrangements.

Jan. 24 to 28—International Heating and Ventilating Exposition, Grand Central Palace, New York.

...OBITUARY...

FRANK H. SLEEPER, noted inventor of spring-making machinery, and president of Sleeper & Hartley, Inc., Worcester, Mass., designer and builder of high-speed automatic spring and wire-working machinery, died Nov. 4 in St. Petersburg, Fla., after a short illness.

Born Nov. 26, 1862, at Coaticook, Quebec, Mr. Sleeper's inventive genius developed early in life, when at the age of 17 he built his first very practical wire machine. At 22 he designed and had patented a ball bearing lifting jack still being manufactured and sold by a leading lifting jack manufacturer in United States and Canada. Until 1905 he designed and built many wire-working machines for the wire companies of Canada. Subsequently the Morgan Spring Co., Worcester, Mass., became interested in his ability, and as a result he was induced to move to Worcester to design special machinery for them. In this capacity he developed a number of spring-making machines. At the end of a five-year contract, he went into business for himself in 1911, designing and building wire-forming machinery for the general trade. As his machines were the first to eliminate all hand operations, the spring industry was revolutionized.

F. H. SLEEPER

In 1913, business having developed so rapidly that he was no longer able to handle it without help, George D. Hartley was taken into the business as office manager. He served in this capacity and also as secretary and treasurer until May, 1936.

Mr. Sleeper's genius and great inventive ability is established by the fact that during his life he took out over 300 different patents, the last one being granted only two months prior to his death.

Included among the many inventions which Mr. Sleeper created and later manufactured are a machine to make the tiny spiral of wire for the Edison Mazda lamp, various types of automatic spring-coiling machines, a screw jack, an alternating current generator, several types of engines, wire nail, automatic lock washer, continuous wire drawing, flexible tube, flexible shaft, flexible casing and cable-armoring machines.

During the past few years, he has not been as active in the business as formerly, spending the winter months at his home in St. Petersburg, Fla., and the summers

A 2 to 1 FAVORITE

In The Automotive Industry

● Automobile manufacturers are most exacting in their requirements for all production machinery . . . and especially so of forging equipment. Of their forging machines they demand fast, accurate, uninterrupted production.

Ajax Forging Machines with patented air clutch have met these demands most satisfactorily . . . that's why at least two out of every three forging machines purchased for automobile production since Ajax introduced the air clutch are Ajax built. These machines are working day and night forging transmission gears, universal joints, flanged drive shafts, steering gear sectors, valves, etc. to meet heavy production schedules.

The experience of automobile builders shows that any manufacturer with forging machine requirements can profit to the utmost by using Ajax Air Clutch Forging Machines.

For Further Information Write for Bulletin No. 65

THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND

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at Lake Massawippi, Ayres Cliff, Quebec.

Mr. Sleeper recently created a plan to perpetuate the business of Sleeper & Hartley, Inc., completing all arrangements for continuing the same management of the business.

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GEORGE D. MORGAN, vice-president and treasurer of the General Railway Signal Co. and one of its founders, died of a heart attack at his winter home in Miami, Fla., on Nov. 1, aged 73 years. He had been identified with the signal company for more than 35 years. With his father he helped organize in 1900 the Taylor Signal Co., which was merged with the General Railway Signal Co. four years later and with which he was identified for more than 35 years. He retired two years ago.

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BENJAMIN LISSBERGER, chairman of the board of the Federated Metals division, American Smelting & Refining Co., died at his home in New York, aged 61 years. He was born and received his formal education in New York, where he was identified with the metals business for 40 years. He was also president of the Summerville Iron Works, chairman of the board of the United Zinc Smelting Corp., and a director of the American Zinc Institute.

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ARNAUD G. HELLER, vice-president of Heller Brothers Co., Newark, N. J., died on Nov. 16.

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C. W. MAYER, formerly manager of the Indianapolis, Ind., office of the Crucible Steel Co. of America, New York, died on Oct. 23.

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WILLIAM HILDITCH, general master mechanic at the Great Lakes Steel Corp., Ecorse, Mich., died at his home in that city on Nov. 13, aged 53 years.

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THOMAS G. LAMANNA, Indianapolis district sales manager for the Gisholt Machine Co., Madison, Wis., was killed on Nov. 8, when his automobile was struck by a train near Anderson, Ind. He had been associated with the Gisholt company since 1928, as a sales representative, first in St. Louis, later in Chicago, and then in Indianapolis. He was a graduate of Columbia University in mechanical engineering. He was 42 years old.

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H. C. BALLORD, manager of the Baltimore branch of the Crucible Steel Co. of America, New York, died on Oct. 22.

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ELIHU R. LYMAN, president of the Massachusetts Gear & Tool Co., Woburn, Mass., died at his home in that city Oct. 29, aged 56 years. A graduate of the Worcester Polytechnic Institute, his earlier years were successively spent with the Buffalo Forge Co., United States Radiator Corp., and Dexter Folder Co. During the War he served as major in the Ordnance Corps, going to France with the 92nd Division. In 1922, associated with Joseph Cavvichi, he formed the Massachusetts Gear & Tool Co., of which he was president and treasurer until his death. He was a member of the United States Chamber of Commerce, the National Metal Trades Association, and the American Gear Manufacturers Association.

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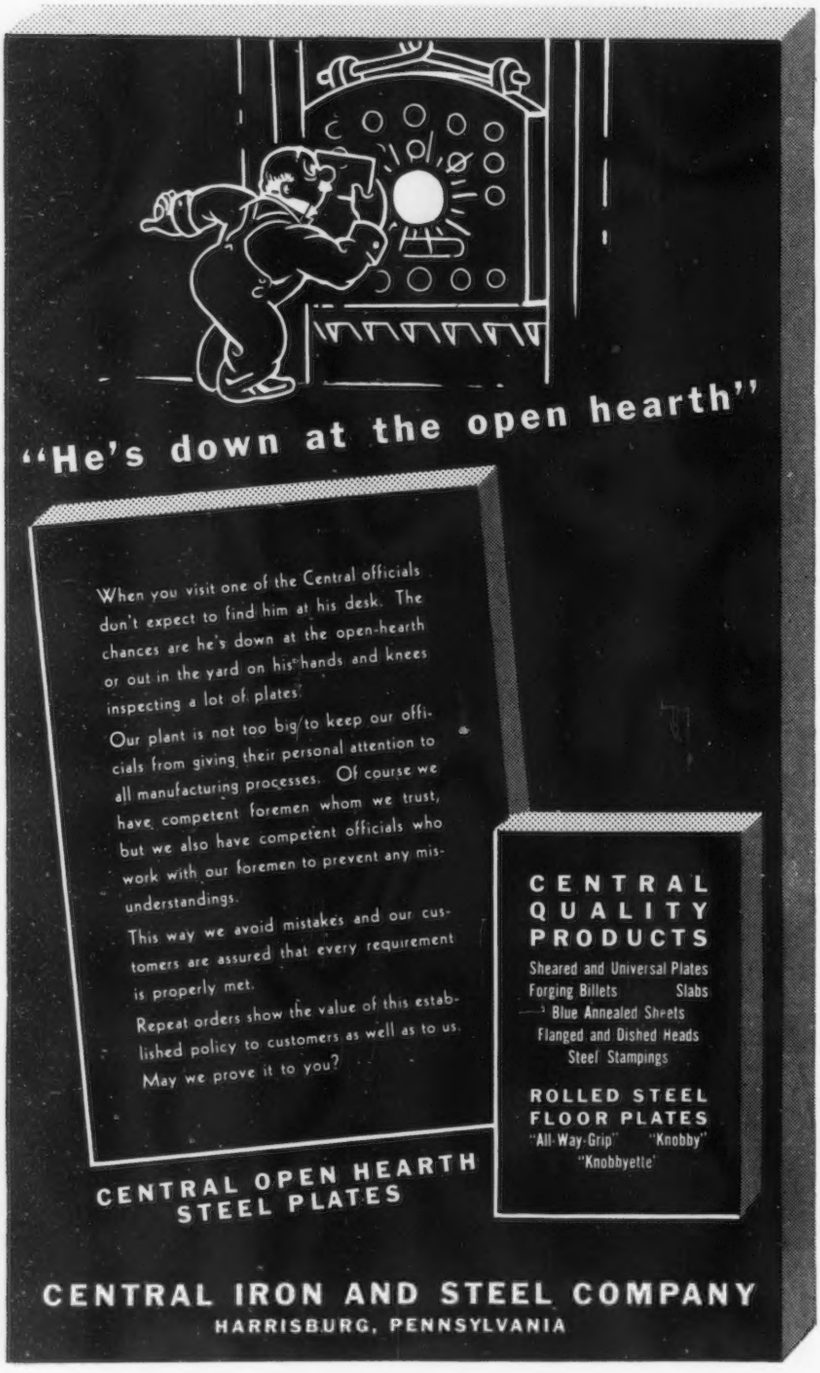
I. H. BARBEE, manager of the Atlanta plant of the Link-Belt Co.,


"He's down at the open hearth"
When you visit one of the Central officials don't expect to find him at his desk. The chances are he's down at the open-hearth or out in the yard on his hands and knees inspecting a lot of plates.
Our plant is not too big to keep our officials from giving their personal attention to all manufacturing processes. Of course we have competent foremen whom we trust, but we also have competent officials who work with our foremen to prevent any misunderstandings.
This way we avoid mistakes and our customers are assured that every requirement is properly met.
Repeat orders show the value of this established policy to customers as well as to us. May we prove it to you?
CENTRAL QUALITY PRODUCTS
Sheared and Universal Plates
Forging Billets Slabs
Blue Annealed Sheets
Flanged and Dished Heads
Steel Stampings
ROLLED STEEL FLOOR PLATES
"All-Way-Grip" "Knobby"
"Knobbyette"
CENTRAL OPEN HEARTH STEEL PLATES
CENTRAL IRON AND STEEL COMPANY
HARRISBURG, PENNSYLVANIA

Chicago, died Nov. 4. Mr. Barbee was graduated in mechanical engineering from Purdue University in 1908 and had served the Link-Belt Co. at its Chicago, Philadelphia and Atlanta plants for 25 years.

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CARL A. CARLSON, former chief assistant engineer at the Lincoln Motor Car Co., died Nov. 19 in Detroit. Mr. Carlson was born in Sweden and had lived in Detroit for 50 years. He was 71 years old.

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LOUIS JAMES FARLEY died Oct. 11 at Detroit. Born in Montgomery, Ala., in 1898 he had lived in Detroit for the last four years and was a sales engineer for the Electric Controller & Mfg. Co.

❖ ❖ ❖

ELMER ELLSWORTH NORTHWAY, for 35 years secretary-treasurer of the Standard Tool Co., Cleveland, died Nov. 13. He had been connected with that company for over 50 years.

❖ ❖ ❖

A. N. MYERS, first vice-president, F. E. Myers & Brothers Co., Ashland, Ohio, pump manufacturers, died Nov. 12, aged 75 years. He had been associated with the company 57 years with his two brothers, the late F. E. Myers and P. A. Myers.

❖ ❖ ❖

WARREN H. COWDERY, one of the founders of and for 20 years president of the American Fork & Hoe Co., Cleveland, died Nov. 13 in Pasadena, Cal., where he had lived for the past three years. After relinquishing the presidency, he served as chairman of the board, from which he retired in 1930.

New Forging Machine Builder at Milwaukee

ELECTRO-FORG-O-MAT, INC., Milwaukee, has been organized to engage in the manufacture of a new type of forging machine, electrically operated, and embodying a process invented in Frankfort, Germany, and perfected by J. H. Maykemper and Herman Finzel, formerly of that city, who recently moved to Milwaukee to manufacture the machine as well as producing forgings in steel, alloy iron and bronze.

The first machine is now in process of manufacture in a new unit recently built by Ampco Metals, Inc., 3830 West Burnham Street, Milwaukee. Carl J. Zaiser, president of the Ampco firm, is a director in the new corporation, officers of which are: president, Mr. Maykemper; vice-president, Mr. Finzel; secretary-treasurer, Elmer U. Gross.

Parts for the new machine are now being fabricated in various Milwaukee shops for assembly and housing in the Ampco plant. It is estimated that the unit will cost $30,000. Its weight is about 35 tons. As contrasted with the conventional method of forging, by this process a metal rod is fed in and the unit electrically heats the metal, cuts it to size and forms the article to be made. No trimming of flash is necessary because instead of displacing metal as is done in hammering, the new process is said to gather it in, resulting in a finer, closer-grained, stronger metallic structure. The designers claim that the machine has a capacity of 25,000 to 50,000 forgings in 24 hr.

The design is covered by letters patent in all nations.

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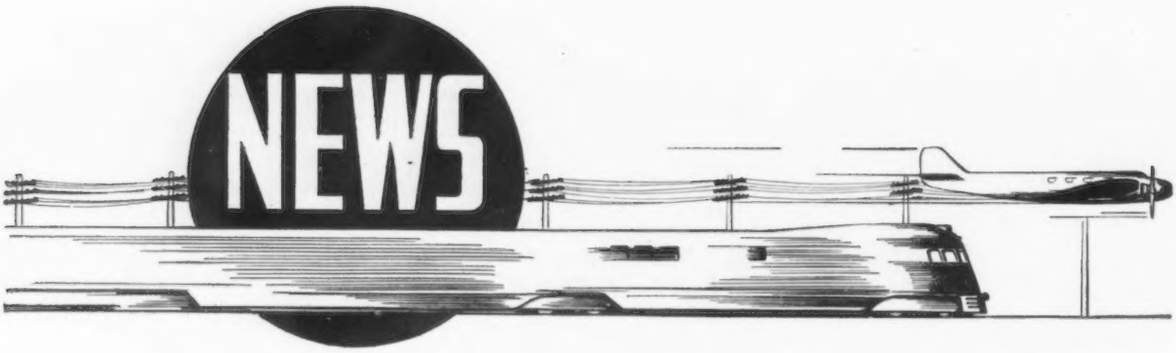

Labor Problems Discussed at 41st Founders Convention

THE complex problems engendered by the fast changing conditions surrounding industrial management today, particularly with reference to labor relations, were the subjects discussed on the unusually interesting program prepared for the 200 founders attending the 41st annual convention of the National Founders Association at the Waldorf-Astoria Hotel, New York, Nov. 17 and 18.

At the opening session on Wednesday F. R. Hoadley, president of the association, welcomed the attending delegates and delivered the presidential address, which was entitled "Industrial Panaceas: Let Us Look at Them." American industry, Mr. Hoadley said, has always endeavored to better labor's condition. However, these efforts have been based on sound economic practices rather than on the plans of power-seeking theorists totally lacking in practical business experience. Until such a time as Congress is able to repeal every existing economic law and alter the nature of the average man, Mr. Hoadley insisted, labor's problems will remain where they are, on industry's shoulders.

One of the most frequent demands of political planners and union leaders is "a fairer distribu-

NATIONAL FOUNDERS ASSOCIATION

OFFICERS FOR 1937-38

President, F. R. Hoadley, Atwood Machine Co., Stonington, Conn.

Vice-President, W. D. Hamerstadt, Rockwood Mfg. Co., Indianapolis

Secretary-Treasurer, J. M. Taylor, Chicago

Commissioner, A. E. McClintock, Chicago

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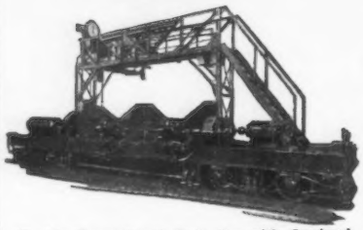
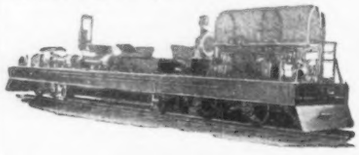


Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.



20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

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tion of national income." An actual analysis of the facts surrounding this statement shows that labor's percentage of the national wealth has been constantly increasing since the birth of industrialism in America, and this increase began long before any labor group conceived this phrase. Mr. Hoadley cited figures compiled by the National Association of Manufacturers, which indicated that the worker's share of the national income rose from 38 per cent in 1850 to 65 per cent in 1929, and that in 1936 the figure stood at 66.5 per cent. No class struggle, the founders' president said, was necessary to achieve this improvement, and the success of future efforts along this line lies in greater and more efficient production.

Touching upon the jurisdictional strife between the AFL and the CIO labor groups, Mr. Hoadley said, "Many of us know by bitter experience, the full effects of jurisdictional squabbles among rival union groups. We do not like these and we try to avoid them by maintaining open shops. But, if we must consider trade versus industrial unionism, let us see what the latter means before agreeing with Mr. Lewis. We concede that there is unity of purpose and interest among workers of more or less equal skill and training. It is logical to expect them to seek advantages through separate agreements and relationships with their employers. Such groups are fairly numerous in every shop and each group formulates its own idea of its rating or standing as to skill and ability. If control is to be vested in the shop nose-counting method, it is entirely possible that the skilled groups will find themselves submerged at a lower level than fits their conceived standards. In other words, they may sacrifice their superior status to the average of the group."

The Minimum Wage Plan

One industrial panacea that has received particular attention from legislators and labor leaders is the theory of "minimum income." If the minimum income of a worker should be set, as some of its proponents have suggested, at $2,500 per year, then the 52,000,000 workers of the country would receive an annual income of over $130,000,000,000, or more than double the total national income in 1936, and over 50 per cent more than the national income in 1929. It is obvious that establishing a minimum income would be merely increasing prices by the amount of the increase in income, with no resultant gain in average welfare of labor.

One of the obstacles that contribute to the lack of confidence on the part of business men, Mr. Hoadley declared, "is the manner in which official utterances vacillate from one course to another and form contradictions to the point where no one can say definitely whether this or that is the fact in the matter. Certainly no manager could assume such an attitude toward the president of his company, nor could the latter so try to impose upon his directors, and no directors could make repeated contradictory promises to their stockholders without soon finding themselves in very hot water.

"Is it any wonder that business winces when criss-cross statements tumble out of the Washington hoppers, and that little credence is given to an optimistic statement, which is quickly undermined by later declarations which portray opposite conditions?"

F. R. HOADLEY

President, National Founders Association

Industry Should Defend Itself

Following Mr. Hoadley's address, John C. Gall, counsel for the National Association of Manufacturers, spoke on "Proposed Legislation on Wages, Hours and Collective Bargaining." Describing the various bills intended to regulate the wages and hours and other phases of industry, Mr. Gall insisted that industry must not ignore the efforts of pressure groups to force this type legislation through, and must face the pending legislation squarely and defend itself by disseminating accurate information concerning conditions in industry today.

The picture of wages and hours in industry is not nearly as black as it is painted by some legislators and labor leaders. From the be-

J. M. TAYLOR
Secretary-Treasurer,
National Founders Association

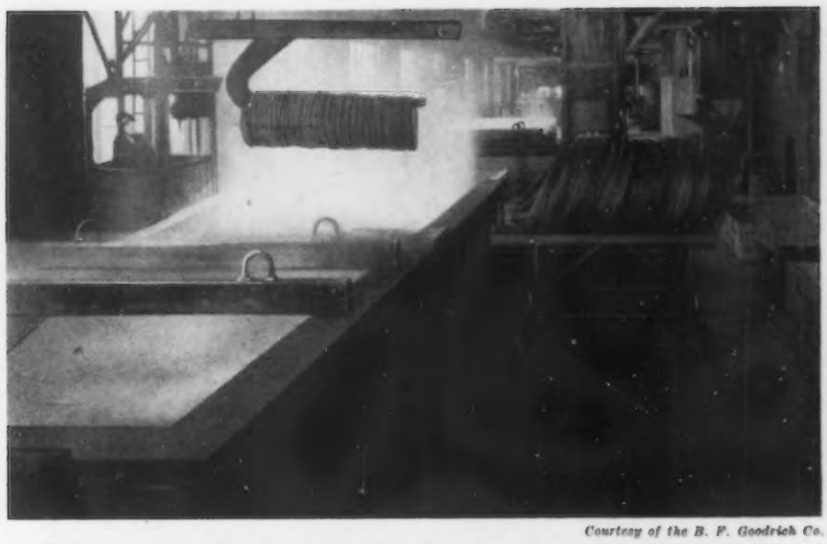
ginning of America's industrial life, Mr. Gall pointed out, the hours and wages of workers have been consistently reduced. This reduction has not come about through legislation, but rather through the efforts of far-seeing industrialists. A similarly exaggerated impression exists with reference to child labor. It is the common impression that industry employs large groups of children, yet the actual facts of the case show this to be an entirely erroneous belief. A survey conducted by the National Association of Manufacturers showed that out of the 2,500,000 workers covered by the survey, exactly 26 were under-age, and each of these under-age employees had been certified by the proper authorities for such employment.

The afternoon session was opened by an address by C. B. Fritsche, managing director, National Farm Chemurgic Council, on "Forging an Alliance Between Industry and Agriculture," followed by a brief talk on "Power, Politics and Labor," by L. Dennis, economist, E. A. Pierce & Co., stock brokers, in which the growth of labor organizations was traced from groups sincerely interested in the welfare of labor, to groups interested mainly in securing power through the manipulation of labor's influence.

Wages at Peak Level

The third speaker on the afternoon's program was Leo Wolman, professor of economics, Columbia University, New York. Mr. Wolman's subject was "Trade Unionism, Labor, Legislation and the Welfare of Labor."

The most striking feature of the recent labor history of this coun-



Courtesy of the B. F. Goodrich Co.

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This installation consists of two rubber lined steel tanks each 14½ ft. long x 10 ft. wide x 6½ ft. deep installed December, 1935, in the Atlantic Wire Co. plant at Branford, Conn. The lining is of double brick and BASOLIT.

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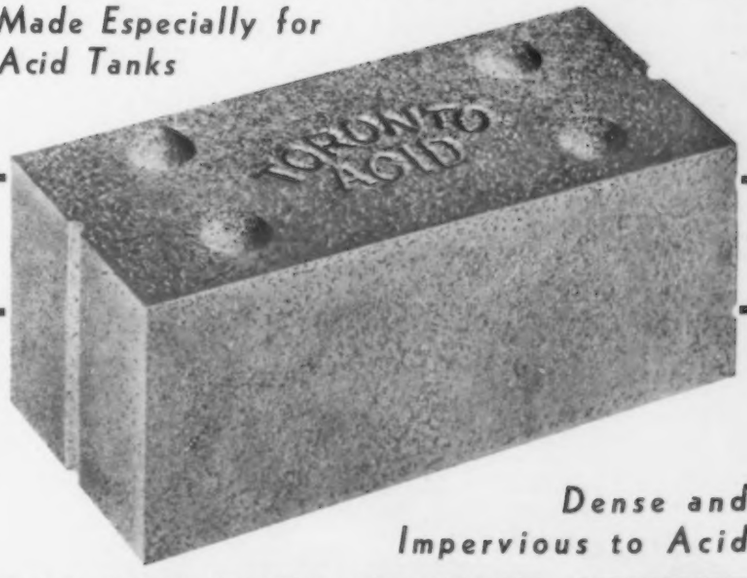

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try, Mr. Wolman said, has been the steady and exceptional increase in the price of labor since 1933. While this rise in wages has been general, it appears to have been greatest in manufacturing industry where the hourly rate of wages has increased 57 per cent from June, 1933, to August, 1937. At their present level the rates of wages of factory labor are the highest yet recorded, exceeding the boom peak of 1920 and the rates in force in 1929.

Throughout this period of rising wages, recovery in many industries has lagged and unemployment has persisted in large volume. Now with another turn in business and another decline in employment, Mr. Wolman said that one might question the soundness of economic policy which depends for its success on raising the price of labor and the level of production costs.

Regulation of Labor Groups

The responsibilities of labor groups and the need for social regulation of unions was covered in a talk by T. Yeoman Williams, managing director, League for Industrial Rights.

Labor unions do need regulation, Mr. Williams stated, not because they are unions, but because they are powerful functional groups and exert great influence upon the economic stability of the country. There is no objection to labor groups when their purposes and goals are socially sound and in keeping with American traditions, but when labor uses its prestige and power to seize property that does not belong to it, and to seek by coercion to attain that which it is entitled to seek only by peaceful means, then a sound public policy predicates Government control of labor organizations.

The Thursday morning session opened with an unusually interesting discussion by Otto A. Jaburek, general counsel of the association, on the legal aspects of the National Labor Relations Act. Following his brief talk, Mr. Jaburek answered questions put to him by the delegates concerning specific phases of the labor act.

Immediately after Mr. Jaburek's discussion, the annual election of officers was held. Acting on the recommendations of the nominations committee, headed by Thomas W. Pangborn, the delegates unanimously approved the re-election of F. R. Hoadley as president; W. D. Hamerstadt as vice-president and J. M. Taylor as secretary-treasurer. Recommendations of the nominations committee covering the personnel of the seven district committees of five each were also unanimously approved by the convention.

A.S.M.E. Plans Annual Meeting in N. Y.

PAPERS relating to machine shop practice, management, maintenance, motion study, materials handling, strength of materials, plastics and safety are among those to be presented before the annual meeting of the American Society of Mechanical Engineers at the Engineering Societies Bldg., 29 W. 39th Street, New York, Dec. 6 to 9 inclusive. Progress reports are to be given on aviation and railway mechanical engineering.

Control of dust in foundries, safety in machine design, radiographic inspection, grinding and maintenance of sintered carbide tools, and measurement of surface roughness are subjects on the roster of the machine shop practice division.

Problems in unionized plants, decisions of the National Labor Relations Board, scientific management in the unionized plant, and labor's attitude toward time and motion study as subjects for discussion indicate how management's thinking must be realigned with changes in the human side of engineering as a result of a resurgence of the organized labor movement.

As usual, a session will be devoted to apprentice training. Two papers relate to safety, including the title, "Adequate Job Training for Accident Prevention." A luncheon session will hear a paper on maintenance control.

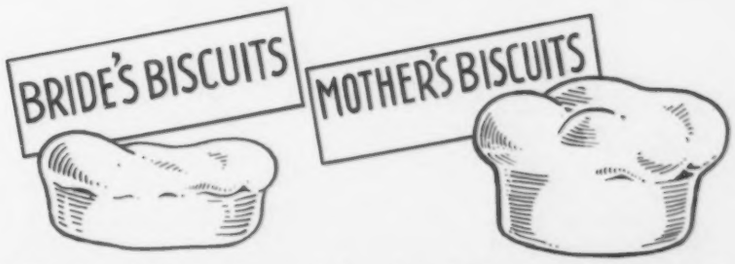
The plastic papers relate to mechanical design and artistic design.

Largest Welded Ship Launched

WORLD'S largest welded ship and first American built turboelectric tanker, the *J. W. Van Dyke*, constructed for the Atlantic Refining Co., was launched Nov. 20 at the Sun Shipbuilding Co.'s plant at Chester, Pa.

Mr. Van Dyke, chairman of the Atlantic Refining board, was among 3000 persons who watched the 541-ft., 18,500-ton craft, intended to run on a six-day schedule between Philadelphia and Texas Gulf ports, slide down the ways after its christening by Mrs. W. M. Irish, whose husband retired as president of the oil company in May.

The vessel has a beam of 70 ft., molded depth of 40 ft., draft of 29 ft. 6 in., cargo capacity of 6,552,000 gal. and speed of 12.25 knots an hr.



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BRISTOL CONNECTICUT

British Stabilize Steel Prices For All of 1938

LONDON (*Special Correspondence*).—The recent action of nine British steel associations in agreeing to a stabilization of steel prices through all of 1938 was unprecedented in that never before have steel manufacturers bound themselves on prices for so long a period. In the announcement made by the British Iron and Steel Federation appears the following significant paragraph:

"In spite of recent world disturbances, there is no abatement of the demand for steel products in this country, and, in taking this course in the face of increased and still rising costs of raw materials, the iron and steel industry is actuated by the desire to contribute to the prolongation of the present level of trade activity and by the hope that some mitigation of the burden of its own material costs may be secured by cooperation with the interests involved."

The agreement provides that all present prices shall be maintained until the end of 1938 but that deliveries after Dec. 31, 1938, shall be at prices then ruling.

Armament Takes 20 Per Cent of Steel

Thousands of manufacturers will now be safeguarded against unexpected increases in the cost of their material for at least one year, and will be free to fix contracts without fear of loss owing to rising prices. As a result the step should give a further impetus to trade activity. In addition, the decision means that the principal factor in the cost of the rearmament program will be unchanged. It is calculated that 20 per cent of Britain's total steel production is now being absorbed by the national defence contracts.

The principal industries affected are automobile and aircraft manufacturing, constructional engineering, railroads, and shipbuilding and repairing. All these industries are now absorbing as much steel as they can obtain. The total consumption of steel in Britain is approximately 1,000,000 tons a month.

Production Rise in 1938 Expected

According to reliable estimates, the total steel production in the United Kingdom will reach a record figure of 13,250,000 tons for 1937, and may rise to approximately 14,000,000 tons in 1938.

The decision to stabilize prices illustrates the great measure of cooperation that now exists between the different units of the industry. Two or three years ago an agreement on similar lines would have been far more difficult to attain.

The Tinplate Makers' Association, the Association of Galvanized Sheet Makers and of Light Castings are not among those supporting the proposals. The reason is that those trades cater largely for the export market and therefore have to compete in overseas markets and deal with world prices. So far as the domestic market is concerned this stabilization, if it succeeds, will largely be made possible by the tariff. If it were not for that foreign steel, which is now more abundant, would be flowing into the British market. Critics of stabilization declare that in due course the high cost of steel will

be reflected in the costs of British manufactures and will make it more difficult for British exporters to compete abroad.

Steel Prices Up 30 Per Cent

During the past 18 months British steel prices have risen by approximately 30 per cent. The first increase was announced in May, 1936, and amounted to 10 per cent. On May 1, 1937, prices of all main steel products were advanced with the approval of the Import Duties Advisory Committee, by sums ranging from 17 to 25 per cent. This advance in steel prices, however, compared with an increase of 80 per cent since 1932 in the prices of the principal raw materials.

The cost of coke has risen to more than double its 1932 level. Since April last, the price has increased from £1 11s. 6d. to £1 16s. 6d. ($7.87 to $9.12).

Iron ore freight rates are nearly two and one-half times higher than they were in 1932, a further increase having taken place in the last eight months of 6 shillings ($1.50) per ton. However, it is now hoped to conclude an amicable settlement with shipowners on this subject.

Galvanizers' Committee Visits Armco Laboratory

THE fall meeting at Cincinnati of the Galvanizers Committee, sponsored by the American Zinc Institute, closed Nov. 18 with inspection of the plant and new research laboratory of the American Rolling Mill Co., Middletown, Ohio.

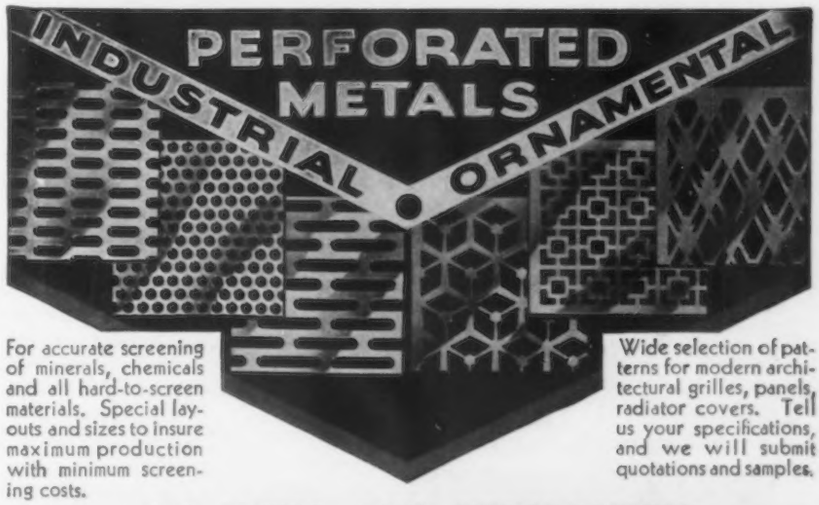
F. G. White, Granite City Steel Co., was reelected governing board chairman. Other board members are G. A. Brayton, Newport Rolling Mill Co.; N. E. Cook, Wheeling Steel Corp.; R. H. Dibble, Carnegie-Illinois Steel Corp.; B. P. Finkbone, American Rolling Mill Co.; D. A. Russell, Youngstown Sheet & Tube Co., and J. L. Schueler, Continental Steel Corp. Sixty members of member companies attended.

"Ebonize" Monel, A New Finish

THE International Nickel Co., Inc., has announced "Ebonized" monel with an ebony finish designed for use where appearance must be maintained under temperatures up to 1400 deg. F.

The material is identical with standard monel except that a lustrous "blue-black" finish is imparted in a specialized oxidizing operation. It has been created particularly for a newly designed heat deflector.

Element pans, reflectors and deflectors in all electric heating units have been source for complaints because the materials from which they are made often suffer heat discoloration or stain and rust. Since this new ebonized metal, like standard monel, possesses complete rust immunity and diversified resistance to corrosion in addition to its new ability to resist discoloration from relatively high temperatures, it helps provide insurance against costly replacements and unsightly appearance.



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NEW YORK SAN FRANCISCO LONDON

The Future Possibilities of Producing Various Structural Shapes by the Cold Roll Forming of Strip Steel

By HOWARD W. KANE
Kane & Roach, Inc.

o o o

IT is axiomatic that standard hot rolled structural shapes are the lowest in cost. However, it does not follow that hot rolled sections are in every case the most desirable for a particular job. On the contrary, with the mounting demand for lighter weight sections, it is possible to secure strength with lightness, either by ribbing or rolling a box section. Our problem, it frequently follows, is to turn out a section that is sufficiently light so that the saving in material justifies the additional expense of the rolling.

H. W. KANE

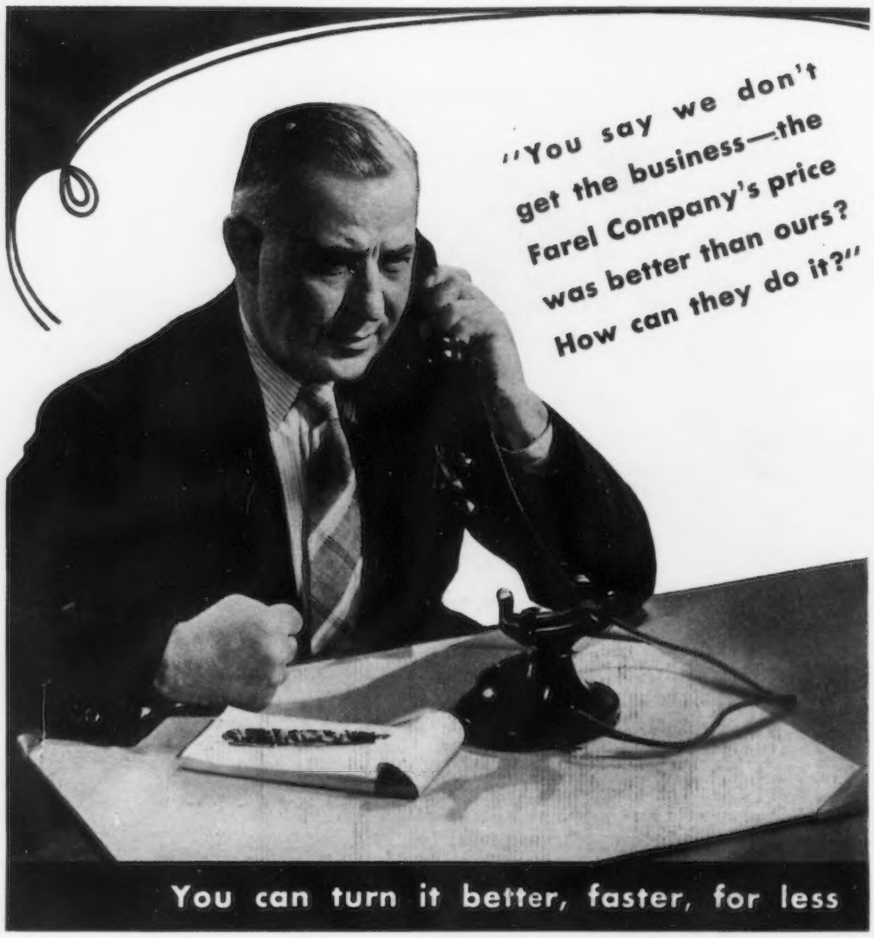
The basic trend all along the line today is toward light weight construction. Steel houses have been in the public eye for a number of years now, but the time is not far distant when some one will make come true the mass production of prefabricated houses on a truly Ford scale. Cold roll forming is bound to play a big part in any such program, which has only now just started.

Lighter Weight in Transportation

Within the last year or two, also, the railroads have been making tremendous strides toward reducing the weight of their rolling stock. Modern, all-steel, high-speed trains of light weight construction are an accepted fact, and here, too, the cold roll forming industry will certainly play a conspicuous part, for light weight sections for interior trim in passenger coaches will be mandatory.

Wherever transportation enters, light weight is all-important, which accounts for the pronounced tendency toward reduction in weight in truck and bus bodies through the use of lighter weight steels. Here again the cold roll forming industry has been playing an important role. With all the genius and adap-

On this and following pages are presented abstracts of some of the 25 papers read before the 33rd convention of the Association of Iron and Steel Engineers, held at Chicago, Sept. 28 to Oct. 1.


"You say we don't get the business—the Farel Company's price was better than ours? How can they do it?"
You can turn it better, faster, for less

tability that the steel industry commands, I also feel sure that it is only a question of a short time before all-steel construction of airplanes is a reality.

Another great advantage to be had with the cold rolled section is that of closer tolerances. The mills set liberal tolerances on their hot rolled sections and it is not practical for them to do otherwise. The cold roll forming machine, on the other hand, because of its flexibility of adjustment, is able to roll to close tolerances with ease.

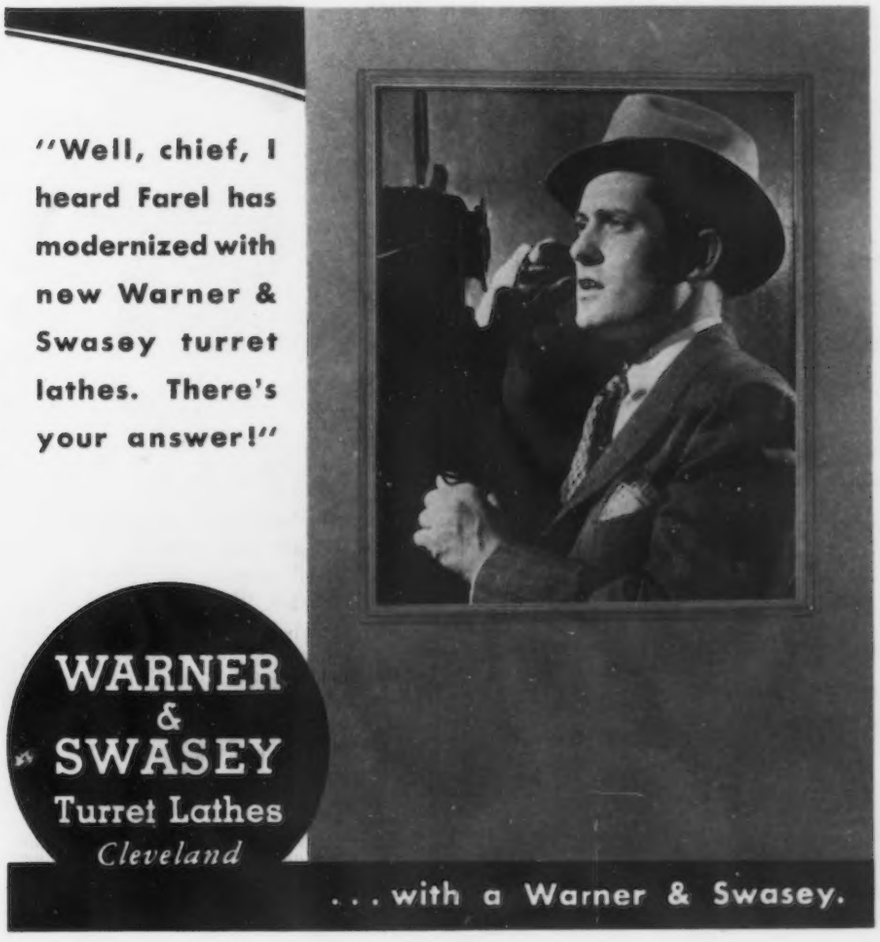
In the ramification of products which are being built today, there is practically no end to the number of shapes and designs which must be manufactured, either through press, hot rolling, cold roll forming, drawing, extruding, or by some other method of forming a shape to get the particular design desired for the individual product. The cold roll forming industry offers a means of forming a great many sections which because of price, quantity or peculiar shape, do not lend themselves to forming by other methods.

Among the advantages of cold roll forming that might be mentioned are high production speed, low initial tooling and machine cost, low unit rolling cost, saving in floor space, low operating cost due to lessened power consumption, and the fact that a section can be completely formed in one pass. It is also possible to cut the piece, bend or coil it, punch, paint, solder, tin or plate it, or braze another coil on—all in one continuous operation. Further, cold roll forming makes easily possible a smooth, high finish of the product.

We in the cold roll forming industry are looking forward to prefabricated steel houses with no mere academic interest, for these new light-weight, low-cost steel houses are going to give a tremendous impetus to cold roll forming, as well as to the thousands of fabricators of countless sections, such as box columns, box beams, electric conduit pipes, studding, door bucks, framing, metal trim, rafters and ridges, conductor and down-spout pipe and gutters.

And as the use of metal trim for dwelling becomes more and more commonplace, one does not need to be especially good at prophecy to visualize what is going to happen to the merchant marine and to passenger carrying ocean vessels. Fancy wood carving and paneling has no place on an ocean-going vessel, where the question of safety is paramount at all times. The graining and staining of steel for interior trim is already an accepted fact. Light weight sections will, of course, be fire-proof, but more than that, they are going to be beautiful as well. Finally, there is going to be mighty little furniture of any kind on the ship of the future that is not going to be made of steel.

Witness what has been happening in porch and office furniture. I am by no means sure that the present vogue of modernistic styling in furniture is here to stay, but of one thing I am sure, and that is that light-weight steel furniture is only in its swaddling clothes. The advantages are obvious and when standardization really starts and prices are brought down, you are going to see the wood furniture industry take a back seat.


"Well, chief, I heard Farel has modernized with new Warner & Swasey turret lathes. There's your answer!"
WARNER & SWASEY
Turret Lathes
Cleveland
. . . with a Warner & Swasey.

United States a Principal Market for Dutch Iron

PIG iron production by the Royal Netherland blast furnace at Ijmuiden, North Holland, expended approximately 13 per cent in the fiscal year ended March 31, 1937, when the total produced was 290,077 metric tons in comparison with 256,411 tons in the preceding period, according to a report received from the American Consulate at Amsterdam by the Metals and Minerals Division, Department of Commerce.

As consumption of pig iron in the Netherlands is relatively unimportant, about 80 per cent of the output is exported. Belgium, Luxemburg, the United States and Finland were the principal markets in the first nine months of this year. The United States took 20,010 tons compared with 62,672 tons in the full year 1936, 47,832 tons in 1935 and 65,718 tons in 1934. In 1936 and 1937 the average price received on exported pig iron was 26.36 florins per metric ton, or about $13.90 per gross ton.

Combination Fired Boilers at Ohio Works,

THE Ohio Works is the iron and steel producing unit of the Youngstown district plants, supplying semi-finished steel to the McDonald Works and Union Works finishing mills, which normally consume its complete output in the form of slabs, billets and blooms for bar and strip products.

Main steel works prime movers consist of reciprocating steam and gas engine blowers for blast furnaces, converters and steam engine drives for blooming mills and their supplementary roll trains. Steam engines use 150 lb. steam at limited superheat. In addition to the normal steel works auxiliary steam requirements a 3700-ft. steam line carries 800 hp. of 150-lb. super-heated steam to the Union Works for heating and auxiliary requirements.

C. H. WILLIAMS

All a.c. power for the district is generated at 25 cycles in the Ohio Works power plant by six gas engine generators of 17,200-kw. total rated capacity, and two 15,000-kw. turbo generators, designed for 240-lb. gage pressure and 540 deg. F. total temperature.

Previous to installation of the new boilers, steam generating equipment consisted of 15—550-hp. fire tube waste heat boilers with economizers and super-heaters, in-

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Tough Alloy Steel Back
Integrally Welded
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a tauter blade means a straighter cut.
On any hack sawing machine, a tauter blade means a straighter cut . . . a High Speed Steel cutting edge means faster cutting . . . and an unbreakable blade guarantees uninterrupted production and full cutting life. MARVEL High-Speed Edge Hack Saw Blades offer all of these factors—permit cutting speeds, feed pressures, and blade tensions limited only by the sawing machine's capacities.
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ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
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Write for Circular

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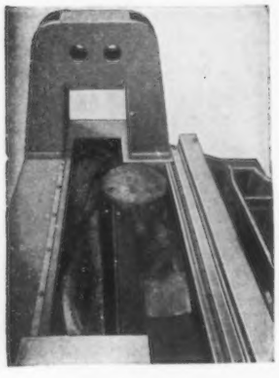
SCRAP BALERS



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100 TC
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and other sizes

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Double Ram Presses
in all sizes

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2724 S. 31st Street Milwaukee, Wisconsin
COMPLETE LINE OF BALERS: Electric and Hydraulic, also HYDRAULIC PRESSES AND PUMPS

o o o

Carnegie-Illinois Steel Corp.

By C. H. WILLIAMS
Assistant Chief Engineer
Carnegie-Illinois Steel Corp.

o o o

stalled on open hearth furnaces and operating at 150-lb. pressure; six 1260-hp. bent tube, underfeed stoker-fired boilers producing superheated steam at 250 or 150 lb. pressure, as required; and 48 scattered and inefficient blast furnace gas fired boilers averaging 350 hp. each and producing 150-lb. saturated steam for general mill use. The immediate demand for added steam generating capacity was the necessary replacement of these latter units.

Powdered Coal Selected

Blast furnace gas in excess of stove requirements was utilized in gas engine blowers and generators and in the displaced boilers. Soaking pit fuel was producer gas, open hearths were fired with tar or producer gas, the proportions depending on the availability of the by-product tar. Without coke oven gas an enriching fuel or an economical high B.t.u. substitute, and with finishing mills located at a considerable distance from the source of blast furnace gas, utilization of this fuel for metallurgical purposes was practically limited to soaking pit use. This is contemplated as a part of the general program of which the boiler plant was the first step. Powdered coal was selected as the logical auxiliary boiler fuel.

The possibility of major future steam economies was anticipated in the installation of new boiler units, designed for ultimate operation at 525-lb. maximum drum pressure and 700 deg. F. total temperature. Four units of 1750 hp. average rating each were installed. These capacities and steam conditions were selected for minimum cost of new units which would provide maximum ultimate economy with topping turbines to exhaust or bleed into the existing low pressure system and balance the supply of waste heat steam to low pressure consumers. Maximum economy and flexibility in the adaptation of extraction or back pressure units was available at these conditions with the minimum cost of new high-pressure units.

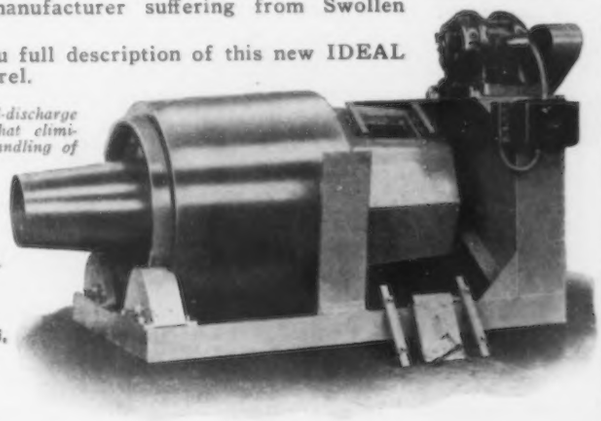
(The remainder of the paper is devoted to a detailed description of the design, control and operation of the new power house units, which were first put into operation in April, 1937.)

It's the 40-cent Man Who Has Profited

Common labor has received the greatest percentage of wage boost. Most cleaning room labor is that kind—unskilled. What have wage increases and shorter hours done to your cleaning and finishing costs? Burnishing, for instance? Here's a burnishing barrel that *cuts* labor cost. It increases output, produces a better finish. That ought to interest any manufacturer suffering from Swollen Payroll!

Let us send you full description of this new IDEAL Burnishing Barrel.

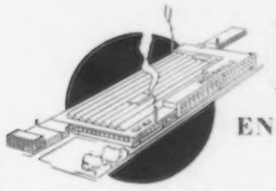
A side-loading, end-discharge burnishing barrel that eliminates all manual handling of balls.



N. RANSOHOFF, Inc.
West 71st St.
at Millcreek
Carthage, Cincinnati,
Ohio

CERTAIN manufacturers have discovered that, despite their huge facilities, Houdaille can produce certain parts or assemblies for them with infinitely greater precision and *at lower cost* than their own facilities permit.

The reason is that over a period of years Houdaille has built up greater batteries of the finest and most modern precision machining equipment in the country—has trained carefully chosen experts to operate it—has developed a staff of design and production engineers to collaborate intelligently with manufacturers.



HOUDE
ENGINEERING CORPORATION
BUFFALO, N. Y.
A DIVISION OF HOUDAILLE-HERSHEY CORPORATION

Open-Hearth Practices in A Steel Casting Plant

(CONTINUED ON PAGE 42)

hole is built up to the bottom level. After all the pools have been rubbed out and filled in with bottom material where this is necessary, slag should be shoveled in, in front of the tap hole to stop the flow of slag into it. The tapping hole is then filled in from the outside with bottom material, which should be rammed in tight. The slag line along the back wall and ends is then made up by throwing bottom material on it with a shovel. The front wall is made up by placing bottom material on it with a spoon.

The contour of the bottom along the back wall and the opening into the tap hole must be maintained, so that when the tap hole is opened the slag will not run out until the steel is practically all out.

At the end of each week, when the last heat has been tapped the furnace should be run hot so as to slag the bottom and two or more slag heats run off depending on the bottom condition. The bottom should not be made up again until within 1 hr. of charging.

The diameter of the tapping hole should be maintained as close as possible to 6 in. When repairs are necessary a 6 in. pipe should be placed in the hole and the space around it filled in with a mixture of ganister or chrome and cement.

The furnace bottom should always provide for a bath depth of 22 in., the measurement to be taken at the center of the furnace.

Conclusions

By the use of a uniform charge from heat to heat and by the control of refining operations, it has been possible to consistently produce the highest grade of steel of required compositions, physical properties, and other qualities.

Pig iron, scrap, slag forming materials and fuel are all analyzed and each charge made in a standard manner as to quantity and composition.

The rate of fuel consumption, draft control and other similar factors necessary for maintaining combustion conditions needed at different stages in the heat, are definitely known to the operator and are recorded for the benefit of the open-hearth superintendent in seeing that the outlined practices are followed.

The result is that heats melt uniformly, show identical melting properties from heat to heat and thus provide a means for consistent results insofar as the finished steel is concerned.

Another factor is the tapping time of heats which may be accurately forecast and production requirements met. Thus, the pouring schedule is arranged so there will be a minimum handling of flasks and equipment in the molding department.

Republic Issues Movie On Fencing

REPUBLIC STEEL CORP.'S latest sound film, picturing production and erection of woven wire fencing (running time 45 minutes) has just been released through Republic's agricultural extension bureau.

Earlier Republic films dealt with stainless and alloy steels, while the new picture, "Steel, Servant of the Soil," traces farm fencing progress, shows crude native furnaces in Africa and remains of early American blast furnaces, and graphically depicts each step in steel wide fence manufacture from iron ore pits to electrogalvanizing and weaving into fencing.

For the first time, Republic reports, approved methods of farm fence erection, including installation of wood and steel corner posts, preparation of the fence for erection and final stretching of the fence are shown in a motion picture.

Standard Bolt Sizes Are Fewer

THE proposed simplified practice recommendation for machine, carriage and lag bolts has received the required degree of acceptance by the industry and is being promulgated, effective from Nov. 1, 1937, according to the National Bureau of Standards. This recommendation is expected to reduce the number of stock production sizes of square-head machine bolts, hexagon-head machine bolts, square-head carriage bolts and lag bolts from 900 to 584.

This Pulley Revolutionized FLAT BELT Performance...

TEN BIG POINTS

1 Belt slippage eliminated.
2 Belt sealed to pulley by Vacuum Cups.
3 Belt "slap" eliminated.
4 Tight stretching of belts unnecessary.
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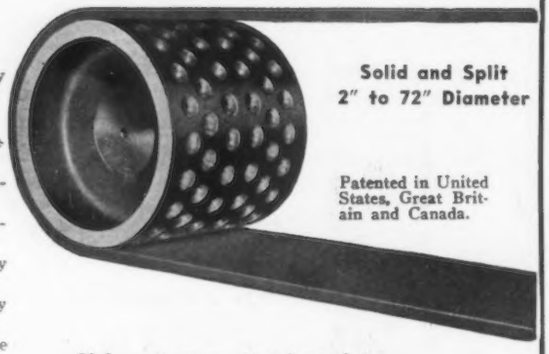
10 Vacuum Cup Pulleys never wear out.



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"A Belt Never Squealed on a Vacuum Cup Pulley"

The Electrical Testing Department of a Large Steel Company

By BIRGER THELE
Testing Engineer, Tennessee Coal, Iron & Railroad Co.

o o o

THE electrical testing department of a steel mill, in the opinion of the author, should come under the supervision of the electrical engineering department. By separating it from the operating department, the testing engineers will be least restricted in

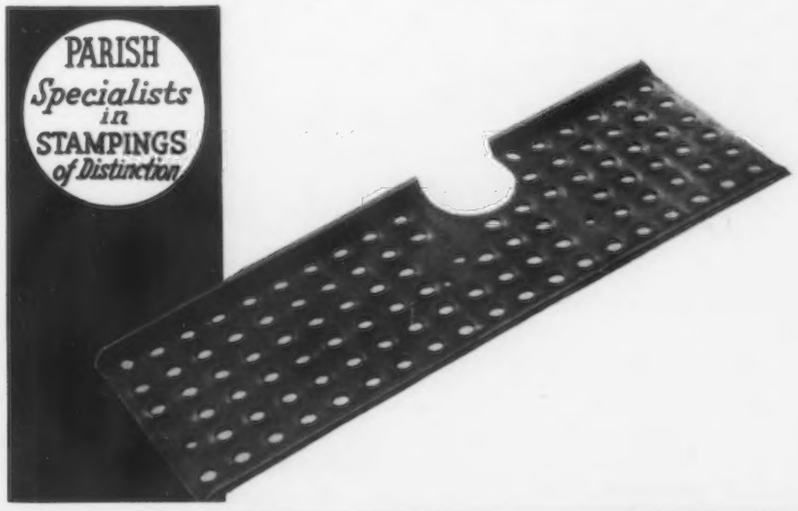
BIRGER THELE

carrying out their work according to their best engineering knowledge. It is necessary, however, that the closest cooperation be maintained between the testing and the operating departments.

It has been found practical to distribute the cost of the electrical testing department to the various departments of a steel company in proportion to the amount of electrical energy which is used by each of them. This method of distribution of the cost encourages the operating superintendents of the various departments to make full use of the services of the testing department, since they have to pay their pro rata share of the expense.

The cost of electric current is a large factor in the total manufacturing cost. Numerous and frequent tests on different operations will enable the testing engineers to establish kw.-hr. per ton factors which, together with the readings from available watthour meters, make it possible for them to determine accurately the energy consumed by the various operations. The monthly distribution of all energy used by the various departments and branches of departments should be made by the electrical testing department, and for this purpose, tests and studies of

PARISH
Specialists in STAMPINGS *of Distinction*



Safety for the Brakemen

Neither the gauge, size nor specifications of a stamping presents any obstacle to Parish. Skill, experience and equipment combine to make difficult stampings comparatively easy in Parish shops.

This non-skid brake step for box cars is 1/4" thick x 30" long x 10" wide. The flange is 1". Embossing around the holes makes the step non-skid. Another of the many types of stampings produced by Parish for many industries.

Have you a problem that could be worked out in pressed metal? Our engineers will do it for you.

PARISH PRESSED STEEL CO., Reading, Pa.
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F. Somers Peterson Co., 57 California St., San Francisco, Calif.

the different operations should be made frequently to insure an accurate distribution.

Comparative tests on new electrical equipment offered by the different manufacturers also constitute an important function of the electrical testing department. Such tests should be made in accordance with the standards of N.E.M.A. or to correspond with the conditions under which the piece of apparatus is expected to work. The performance of such tests by the Testing Department will many times eliminate the necessity of trying out the different kinds of equipment in operation.

An electrical testing department, if properly used, will pay for itself by safeguarding the expensive electrical equipment, thus preventing many costly failures and delays. In case of a failure it can save the expense of unnecessarily long shutdowns by correct analysis of the trouble or by prompt location of the fault.

It can also effect a saving for its company by keeping a constant check on all power requirements and by discovering wasteful practices.

Columbia Steel Installs New Mills, Speeds Modernization

A MODERNIZATION program involving construction of a new Los Angeles office building and rehabilitation and replacement of mill machinery is being undertaken by Columbia Steel Co., San Francisco, subsidiary of United States Steel Corp.

Plans are being completed for an office building in Los Angeles to house the company's southern California sales force. Warehousing facilities are being enlarged in that city, and at the company's nearby plant in Torrance work is being completed on the installation of new machinery.

A new three-high roughing mill and new furnaces for the jobbing mill have been completed and a mechanized finishing mill with double compartment pack furnace was placed in operation Oct. 13. A similar mill was scheduled to begin production early this month.

A Landis roll grinder started operation last month. Cold mills, bar shears and the Mesta pickler at the Torrance plant have been relocated while building extensions, crane runways and new roofing are more than 90 per cent complete.

Columbia Steel's blast furnace at Provo, Utah, now being rebuilt, is expected to be blown in Dec. 1. The company's coal mine at Columbia, Utah, has been mechanized with installation of drilling, cutting, loading and hauling equipment eliminating all manual labor, the company reports.

In Pittsburgh, Cal., a new galvanizer for manufacture of long-life wire has been placed in production, while other improvements are planned.

U. S. Foreign Trade Higher in 1937

FOREIGN trade of the United States has risen 12.3 per cent since Jan. 1 and is 26.2 per cent higher than a year ago, while latest estimates indicate a slight decline recently, the National Industrial Conference Board reports. A decline in world industrial activity has been modified by a continued high production rate in Great Britain, Germany, Sweden and Australia according to the board's latest survey.

Sales Manual for Appliance Men

THE Porcelain Enamel Institute, 612 North Michigan Avenue, Chicago, has just published a 92-page book entitled "How to Increase Your Sales." Written by an authority on the preparation of sales manuals, this book is designed to help home appliance salesmen increase both the number of units sold and the unit value for each sale. The book is primarily concerned with selling and is not written about porcelain enamel, although some of the sales examples may be built around porcelain enamel. Sample copies of the book for inclusion within appliance salesmen's kits may be obtained without charge from the institute.

U. S. Steel Launches New Ore Freighter

THE second ore freighter to be launched on the Great Lakes in seven years slid down the ways Monday when the Pittsburgh Steamship Co.'s new vessel, the *Ralph H. Watson*, was christened at the River Rouge, Mich., yards of the Great Lakes Engineering Co. The vessel was named after the vice-president in charge of operations of the United States Steel Corp., of which the steamship company is a subsidiary. With its three new companion ships, the *Ralph H. Watson* will increase the Pittsburgh fleet to 73 freighters and six barges, largest on the Lakes.

Rail Car Loadings Continue Decline

CARLOADINGS in the first 13 weeks of 1937 were 17.1 per cent above the like period of 1936, in the second 13-week period 15.7 per cent above 1936 and in the third 13-week period only 6.7 per cent above the corresponding period of last year, according to a report to the Association of American Railroads. Loadings of revenue freight in the first six weeks of the fourth quarter, Oct. 1 to Nov. 6, were 2.8 per cent under the same period of 1936, the loading in each week this year since Oct. 2 being under the like week of last year.

Spokane Buys High Efficiency Pumps

TWO vertical pumps with an over-all plant efficiency of more than 80 per cent, delivering 15,000 gal. of water a minute against a head of 420 ft., have been installed by the City of Spokane, Wash. These pumps deliver water at a cost of less than 1c. for each 1000 gal. and were built by the Pomona Pump Co. They are the deep well turbine type and are powered by 900 hp. Westinghouse motors. A flood switch in the reservoir automatically starts and stops the plant by remote control.

Business Slump Forces Steel Industry To Discharge 60,000

APPROXIMATELY 60,000 men have been discharged by steel producers in this country since April when an all time high of 603,000 wage earners and salaried workers were employed in the steel industry.

This estimate, reflecting the sharp decline in ingot production during recent months, includes salaried and hourly paid workers and does not include employees laid off but still carried on payrolls. Some large steel companies state that they have not discharged many men during the business recession but have reduced hours of work.

Included in the estimate of 60,000 are several thousand workers dropped during the last few months when plant construction jobs were completed. Other thousands were dropped by companies hiring heavily last spring to spread work through the 40-hr. week and avoid time and a half overtime expense which some plants continued to pay.

Labor contracts signed with the Steel Workers Organizing Committee had little bearing on discharges and lay-offs. Some signed steel companies have discharged workmen, others have laid them off. Unsigned producers also have had no uniform policy of cutting payrolls to meet the business slump.

..GREAT BRITAIN..

. . . Heavy steel products still in good demand; pig iron and semi-finished steel supply easier.

LONDON, Nov. 23. (*By Cable*).—Mills making heavy steel products are still operating at full capacity and are expected to continue so, as there is large-scale specifying by home industries of plates, joists and sections. Export demand remains quiet.

Prices of forge pig iron, phosphorus content 0.75 per cent and higher, for delivery during the first half of 1938 have been continued unchanged. Foreign buying of pig iron has materially decreased since the loyalty rebate of 5s. per ton has been applicable to domestic purchases. British pig iron supplies are now ample.

Semi-finished steel is in better position as the British output is increasing.

Unfavorable conditions continue in Continental steel markets. American competition, especially in Holland, is considered serious. Official prices are being nominally maintained, but concessions are permitted where the competition is particularly severe.

Tin plate buying is negligible and unfilled orders are about 4,250,000 base boxes. Output is at about 80 per cent of capacity. September production of tin plate and black plate was 89,200 tons, highest in many months.

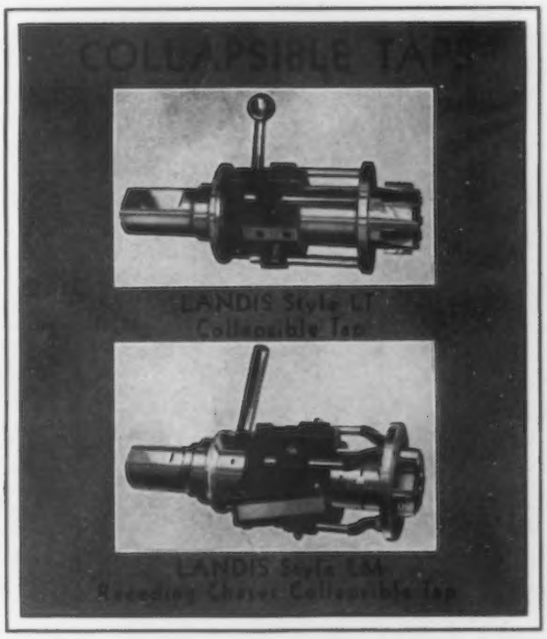
Black and galvanized sheets are quiet, but inquiry is broadening. Mills are now able to give early shipment. The Brygwyn and Whitford sheet mills, both in the Richard Thomas group, have shut down indefinitely, displacing 1000 men.

British prices are unchanged. Continental gold prices are also unchanged.

The LANDIS Line

includes

LANDIS REG. U.S. TRADE—MARK PAT. OFF.



The precision, economy and reliability of LANDIS Collapsible Taps are due to distinctive features of design. These features include detachable tap head construction, positive size adjustment, new locking and collapsing mechanisms, interlocking plunger and chaser support, etc.

May we send complete details? Write today.

LANDIS MACHINE CO., Inc.

TAP DIVISION

WAYNESBORO, PENNA.

Flux in Flame for Production Brazing

FOR production brazing a new process involving the use of a liquid flux that is mixed with the gas, then carried into the gasline and discharged through the torch with the flame has been developed by the Automatic Gasflux Co., 622 Frankfort Avenue, Cleveland. The liquid flux that takes the place of the dry flux commonly used is made of chemicals according to a formula developed by this company, which also has brought out the apparatus shown for mixing the flux and gas and delivering it to the torch.

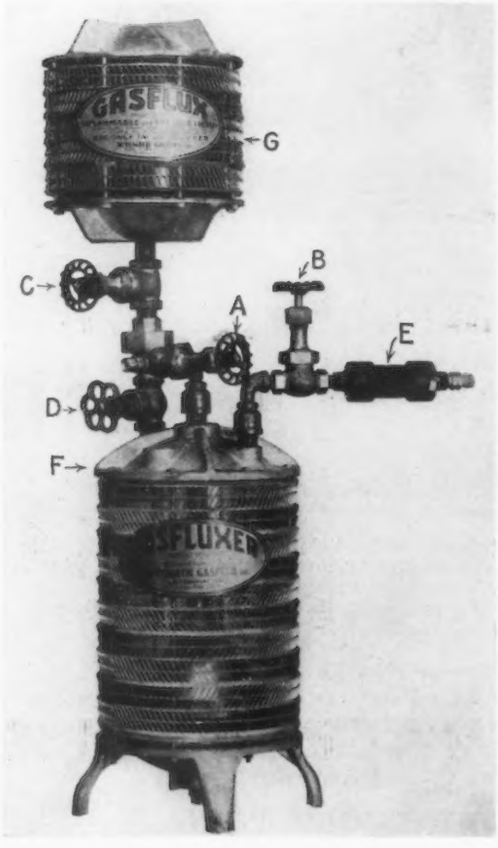
The flux, which is an inflammable and volatile distilled liquid, is stored in a small reservoir at the top of the fluxing apparatus, passes down into the bottom of the fluxing tank and bubbles up into the tank, becoming thoroughly mixed with the gas. In the illustration of the apparatus "g" is the flux storage tank; "f" is the fluxing tank; "c and d" valves in the line that deliver the flux to the fluxing tank; "a" the gas inlet valve; "b" the gas outlet valve and "e" a flashback.

The quantity of flux used is controlled by the two valves in the flux supply line. Air is mixed with the gas and flux near the torch. Several torches may be connected to one fluxing unit. The fluxing apparatus is made in various sizes and the tanks are of glass or metal.

Natural or artificial gas may be used with this equipment or ferrolene gas made by the Gasflux Co. This is a gas that is produced by mixing with natural or artificial gas ferrolene liquid which is high in hydrogen content. Acetylene gas may also be used.

Production brazing it is claimed can be done more rapidly with the use of this process. The brazing operation is simplified, a more uniform quantity of flux is used because the dipping of the brass welding rod into a dry flux is eliminated and with a regulated and even flow of flux more even and uniform and cleaner welds are made. Obnoxious fumes present in bronze welding with dry flux and caused by the use of excess flux are said to be minimized. The finished weld when made by this process, it is stated, is so smooth that the joint requires a minimum amount of grinding and, because of the absence of hard residue or slag in the weld, pickling is not required.

Several applications of this method of brazing have been made. One of the first users of the process is the Shelby Cycle Co., Shelby, Ohio, which has adopted the process for production work in brazing bicycle frames.



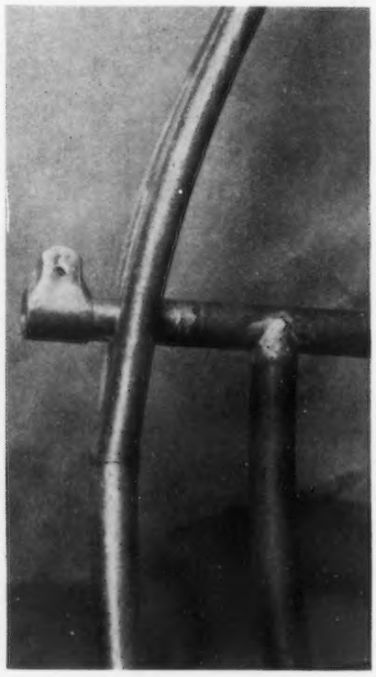
AT LEFT

FLUXING material in liquid form is fed to the flame of the brazing torch in this apparatus.

o o o

AT RIGHT

A BICYCLE form brazed by the Gasflux process.



Prefabricated Houses Called Two Booms Away

The era of pre-fabricated homes in this country is "two building booms away," according to Roy Wenzlick, nationally known real estate analyst of St. Louis, and author of the book "The Coming Boom in Real Estate." Mr. Wenzlick addressed approximately 1000 Detroit business men at the Book-Cadillac Hotel at a joint meeting of societies representing architects, builders, real estate men, bankers and manufacturing groups.

MONTHLY SHIPMENTS OF FINISHED STEEL PRODUCTS BY UNITED STATES STEEL CORP.—TONS

Month	1933 Shipments	1933 Per Cent of Capacity	1934 Shipments	1934 Per Cent of Capacity	1935 Shipments	1935 Per Cent of Capacity	1936 Shipments	1936 Per Cent of Capacity	1937 Shipments	1937 Per Cent of Capacity
January	285,137	17.7	331,777	19.8	534,055	31.9	721,414	44.8	1,149,918	*75.4
February	275,929	18.5	385,500	25.9	583,137	39.2	676,315	45.3	1,133,724	82.5
March	256,793	15.3	588,209	35.2	668,056	41.5	783,552	50.5	1,414,399	92.7
April	335,321	21.6	643,009	41.5	591,728	36.7	979,907	63.2	1,343,644	91.0
May	455,302	27.1	745,063	44.5	598,915	35.8	984,097	63.4	1,304,039	85.5
June	603,937	37.4	985,337	61.2	578,108	36.7	886,065	57.1	1,268,550	85.8
July	701,322	45.1	369,938	23.9	547,794	34.0	950,851	61.3	1,186,752	77.9
August	668,155	39.8	378,023	22.6	624,497	37.3	923,703	59.6	1,107,858	72.6
September	575,161	35.6	370,306	23.9	614,933	39.7	961,803	62.0	1,047,962	71.1
October	572,897	35.5	343,962	20.6	686,741	41.1	1,007,417	62.6	792,310	52.0
November	430,358	26.7	366,119	22.7	681,820	42.3	882,643	59.2	.....	...
December	600,639	38.7	418,630	27.0	661,515	42.7	1,067,365	68.8	.....	...
Plus or minus yearly adjustment	(+44,283)	...	(—19,907)	...	(—23,750)	...	(—40,859)	...	.....	...
Total for year	5,805,235	30.1	5,905,966	30.6	7,347,549	38.1	†10,784,273	58.2	.....	...

* Annual capacity 17,929,400 gross tons, with monthly percentages based on actual number of weeks in each month.
† Adjusted.

U. S. Steel Shipments Decline in October

FINISHED steel shipments by United States Steel Corp. subsidiaries for October totaled 792,310 tons, off 255,652 tons, or 24.4 per cent from the September figure of 1,047,962 tons. At 52 per cent of the corporation's capacity, the October volume is the lowest of any month this year, and is below the October, 1936, shipments of 1,007,417 tons. This is the first time this year that a corresponding month's figure last year has been higher.

For the 10 months of 1937, shipments were 11,749,156 tons, representing an increase of 2,874,032 tons, or 32 per cent over the 8,875,124 tons shipped in the comparable 1936 period.

Freight Cars At Seven Year High

NEW freight cars placed in service by Class I railroads in the first 10 months this year totaled 62,911, the largest for any corresponding period since 1930, the Association of American Railroads has announced. Class I railroads in the first 10 months of 1937 also installed 305 new steam locomotives and 52 new electric and diesel locomotives, a new high since 1930. Last year 73 new steam locomotives and 27 new electric and diesel locomotives were installed.

G-M To Spend $5,000,000 To Protect Workers' Health

GENERAL MOTORS CORP. will spend more than $5,000,000 for air conditioning and forced ventilation equipment to protect health of more than 210,000 factory employes by controlling dust and fumes in shops and foundries. Included in that sum will be salaries and other expenses for medical equipment and physicians in a program to safeguard employees against occupational diseases, the corporation announced.

Tuthill Spring Forms Metallizing Division

TUTHILL SPRING CO., 760 Polk Street, Chicago, Ill., has announced the formation of a new Metallizing division. The company describes metallizing as the process of spraying molten metal on to any solid object by feeding a wire of any desired material through an oxy-acetylene flame gun to (a) build up worn machinery parts, (b) prevent corrosion, (c) decorate ornamental wood parts, stone and other materials.

Adopted by Industry Throughout the World

Thousands of orders from all parts of the world—totaling literally millions of KLOZURE Oil Seals—are evidence of the superiority of the GARLOCK KLOZURE. The sealing element is made of a special compound which is dense, grainless, tough, resilient—resists oil, heat and wear. Complete range of sizes. Write for catalog!

PATENTED

THE GARLOCK PACKING COMPANY, PALMYRA, N. Y.
In Canada: The Garlock Packing Company of Canada, Ltd., Montreal, Que.

Garlock **KLOZURE**

New Articulated Ram Truck for Coiled Strip Handling

A NEW 55-in. lift tilting ram truck especially designed to speed up the handling of strip steel in coils up to 16,000 lb. weight has been announced by the Yale & Towne Mfg. Co., Philadelphia. Drive wheels are located at the load end of the truck, with the steering wheels under the battery compartment in order to give a very sharp angle of steer and preserve maximum stability. Since the load is thus taken on a rigid, non-steer axle, with widely spaced bearings in each wheel, instead of on the usual steering knuckles there is an important maintenance advantage in this construction.

The frame of the truck is divided in a vertical plane, forward of the battery compartment. The two parts are connected first by a horizontal 3½-in. pivot bar of hardened steel set low in the vertical transverse plates forming the front end of the battery compartment and the rear end of the load section, and second by bolts running through slotted openings in these plates, higher up. The frame is thus, in effect, rigid fore and aft, but each end is free to articulate about a fore and aft axis. Therefore, over uneven ground, and regardless of whether the truck is loaded or empty, maximum stability is assured, and at the same time all the wheels are on the ground at any steering angle, with equalized loads on either side.

Further, it is claimed that the load distribution is such that a minimum of 25 per cent of the weight of the empty truck is carried by the drive wheels, assuring ample traction when the truck is not loaded; and a minimum of 25 per cent of the combined total of truck weight and load is carried by the trailing wheels, assuring accurate response to steering when the truck is loaded.

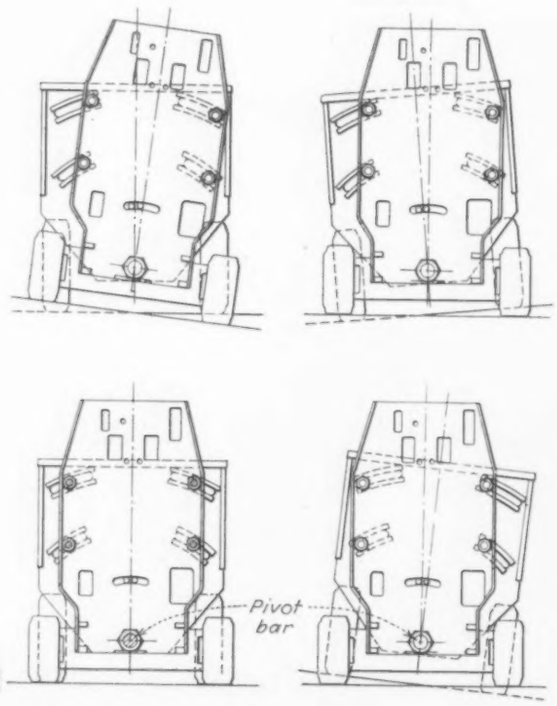
The accompanying illustrations show the unique articulation feature, and the various positions assumed by the two ends of the truck in running over uneven floors.

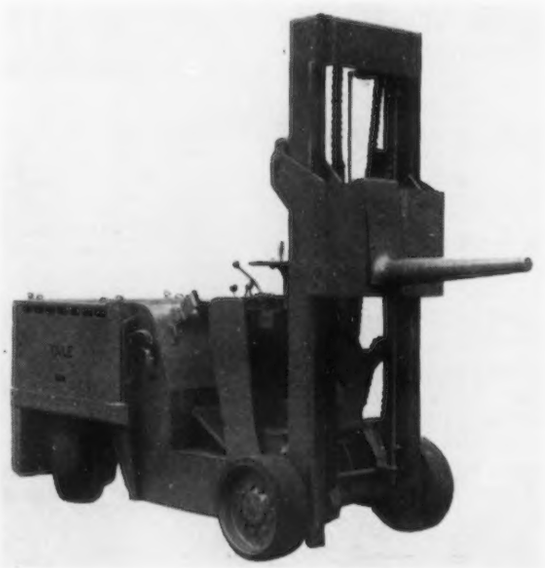
As a direct consequence of this articulated construction, and the distribution of the weight of the truck itself, the natural swing of a heavy coil carried with the ram in the elevated position and with the truck turning a sharp corner fairly rapidly, will not affect the stability of the mechanism adversely. Consequently higher travel speeds are possible with safety.

The ram may be lifted to a maximum height of 55 inches above floor level, and the lifting mechanism may be tilted backwards 8 degrees or forward 2 degrees. With a total overall length of 167½ in. from point of ram to rear end of battery compartment, and a total overall width of 52½ in. outside to outside of drive wheels, the truck can be swung around a right-angled corner in aisles 106 in. wide.

Iron Sheets Used In Porcelain Signs

PORCELAIN signs, with 18-gage iron sheets made by American Rolling Mill Co. as a base metal, are being manufactured by the Ingram-Richardson Mfg. Co., Beaver Falls, Pa. Announced as the first of the kind the signs, kept clean and shining by rains, are being erected in the vicinity of Rochester, N. Y., for the Genesee Brewing Co.





ARTICULATION effects in New Yale ram truck when running over uneven floors (at left). (At right) Yale articulated ram truck for handling coiled strip rapidly.

Automotive Production To Be At Slower Pace In December

DETROIT, Nov. 23.—A shutdown of Chrysler plants in Detroit from the day before Thanksgiving to Dec. 6 was reported probable. The corporation is expected to operate only 15 days in December. General Motors Corp. plants probably will operate not more than 12 days during the next month, and at the Hudson Motor Car Co. plants 40 to 50 per cent of the workers were expected to be laid off because of reduced operating schedules.

Officials of the International Union of United Automobile Workers denied late Monday that any move had been launched by the unity faction or by discontented members to force an emergency national convention. Such procedure was anticipated in some quarters as a *coup d'état* to bring about the removal of Homer Martin as president.

It was admitted by spokesmen that this step had been considered by a minority several months ago before the national convention at Milwaukee. A petition of 25 per cent of the members would be required to bring about an emergency convention.

Meanwhile the forceful attitude adopted by Martin in bringing about the evacuation of Fisher Body plant in Pontiac had greatly strengthened his position and given his administration more stability, it was believed. Opposition forces climbed on the band wagon after he had swayed the Pontiac group back into line and meetings of the executive board starting Tuesday morning were expected to thrash out the matter of union discipline and internal factionalism.

(For further information on automotive situation, see Assembly Line, page 62.)

SWOC Warns Against Wildcat Strikes As UAWU Holds One

PITTSBURGH, Nov. 23.—The Steel Workers Organizing Committee this week took steps to defend itself against fresh attacks expected to follow unauthorized automobile union strikes in the Detroit area.

In a new handbook, "Handling Grievances," the SWOC, which recently has shown anxiety to be considered apart from some other John L. Lewis-CIO affiliates such as the UAWU, warns against wildcat steel strikes.

Likewise, the SWOC cautions steel union leaders to get both sides of every grievance before acting, refuse to handle unjustified complaints from workmen and refrain from coercing or intimidating workmen into joining the union.

These warnings, coming as the automobile union again violated its General Motors Corp. agreement, precede the SWOC convention at Pittsburgh in early December, when an insurgent group is expected to back a drive to oust coal miners' leaders who also hold high salaried positions in the SWOC. In this list are Philip Murray, the SWOC chairman; Clinton S. Golden, Pittsburgh regional director; Van A. Bittner, Chicago regional director, and others.

The December SWOC convention is being called to prepare the SWOC policy for negotiations (to start Feb. 7) which labor leaders hope will result in signing of new union contracts with many steel companies. Most current SWOC contracts run out Feb. 28.

Stainless Steel Exhibit Opened

AN exposition of stainless steels made by a number of companies and of a wide diversity of fabricated stainless steel products was opened to the public Nov. 22, at the Museum of Science and Industry, Rockefeller Center, New York. The exposition is sponsored jointly by the museum and the Electro Metallurgical Co., New York. It will continue for several months and will be open daily from 10 a. m. to 10 p. m. A number of talks and demonstrations will be given at scheduled intervals daily.

Different sections depict historical features, metallurgical development and the manufacture of the steel and its rolling, stamping, welding and other fabrication. Finally, the various uses of stainless steel are shown, these being grouped into domestic, architectural, medical and dental, food and chemical processing, general industrial uses, and transportation. The large number of actual samples are supplemented by interesting demonstrations, live exhibits, photographs, and other pictorial presentation.

John G. Jennings, Bolt Manufacturer, Dies

JOHN GOULD JENNINGS, chairman of the board, Lamson & Sessions Co., Cleveland, with which he had been connected 54

JOHN G. JENNINGS

years, died of a heart attack Nov. 21 while on a train bound for St. Petersburg, Fla., where he had intended to spend the winter. A native of Cleveland, his first employment after graduating from Yale University was as a bookkeeper for the Peck, Stow & Wilcox Co., Cleveland hardware manufacturer. In 1884 he went with the Lamson & Sessions Co. as a bookkeeper and from that position rose to the presidency. He was also vice-president of the Johnston & Jennings Co., Cleveland. Mr. Jennings for years had been prominent in church and philanthropic activities. A son, Lamson Jennings, is vice-president of the Lamson & Sessions Co.

"End Hate," Vandenburg Tells Roosevelt In Recovery Speech

WASHINGTON, Nov. 23.—Blame for the current business decline was tossed on the New Deal's doorstep here Monday night when Sen. Arthur H. Vandenberg, Michigan, called for an end to "the old crucifying hymn of hate" and presented a 10-point program for recovery.

"Business must not be permitted to run the Government," he said, "but unless it is permitted reasonable latitude to run itself—free from an ambitious collectivism which creates more problems than it solves—prosperity will die on the vine.

"The chief trouble with business today is a jittery frame of mind. It is a fear induced by a long series of attacks by Government statutes and by epithet — which have aroused class hatreds heretofore unknown in our heretofore united country.

No Time for Bitterness

"You cannot call harsh names for five years and expect all to be forgotten because you suddenly sober and plead for a 'contented society of good will,'" Senator Vandenberg declared in his radio talk opening the Senate Republicans' attack on New Deal policies.

Green Blocks Wage-Hour Bill Passage, Calls NLRB "Unsafe"

WASHINGTON, Nov. 23—William Green at midweek apparently had blocked passage of the proposed Wage-Hours Bill in its present form by warning that the American Federation of Labor would oppose an early vote on that controversial measure.

Disruption of labor's rights and opportunities by the National Labor Relations Board and the business-employment slump have changed the federation's moderate approval of the Black-Connery measure to disapproval, the federation president said.

"It is generally recognized, and the AFL insists, that it is no longer safe to permit a government board (the NLRB) of that kind to make the many determinations necessary in the administration of the fair labor standards bill as now written," Mr. Green said.

In a letter to Mrs. Mary T. Norton, chairman of the House Labor Committee, the AFL leader urged the labor measure be reconsidered by the committee. This followed Secretary of Labor Frances Perkins plea for its speedy passage and John L. Lewis' request for "action" despite the bill's limitations.

Ford Inquires On Structurals

DETROIT, Nov. 23—A large tool and die shop consolidating the major part of Ford Motor Co. work of this type will be erected soon at the River Rouge plant. A building 300 x 1225 ft. is to be erected west of the steel mill. Prices were asked Monday on a pound basis for 4500 tons of structural steel.

The building is to take the place of an addition to the steel mill transfer building which was started last spring. Work on this earlier project was stopped abruptly without explanation apparently when plans for the forthcoming structure were conceived. It has been learned that a foundry building addition will be erected soon by Ford.

Labor Board Calls Two More Elections

WASHINGTON, Nov. 23—With CIO-AFL peace conference sessions postponed until Nov. 29, labor's leaders turned their attention to other pressing matters including activities of the NLRB, whose alleged CIO favoritism may precipitate revision of the Wagner Act.

The board's latest move involving the craft and industrial union warfare was to call an election at the Allis-Chalmers plant, West Allis, Wis., over the protest of Edwin S. Smith, a board member.

The plant's 10,000 workers will vote for either the UAWU, CIO affiliate, or one of three craft unions, depending on their jobs. Craft unions involved are the Independent Draftsmen, the International Brotherhood of Firemen and Oilers and the International Brotherhood of Electrical Workers.

The Labor Board also has scheduled an election before Dec. 3 at the Carrollton Metal Products Co., Carrollton, Ohio, to permit the company's 133 workers to choose between the AFL's International Association of Machinists and the CIO's Amalgamated Association of Iron, Steel & Tin Workers of North America as their exclusive collective bargaining representative.

All production and maintenance employees, including eight previously discharged workers, were listed by the Board as eligible for voting.

Navy Drops Awards On Ferromanganese

WASHINGTON, Nov. 23—Acting under orders of the Chief of Naval Operations, the Bureau of Supplies and Accounts, Navy Department, has decided to make no awards on recent bids on 8900 tons of ferro-manganese and 24,000 tons of manganese ore.

Action was withheld partially because of protests of domestic manganese ore producers who complained that they were shut out from bidding because the specifications prohibited bids on nodulized and sintered ores. Also involved is said to be the question of making 80 per cent ferro from certain grades of foreign manganese ore.

H. B. Smith Co. Expands Plant At Westfield

H. B. SMITH CO., Westfield, Mass., maker of cast iron boilers and radiators, is installing new equipment and building a new structure for housing its machine shop at Westfield.

Manufacturing activities will be center in plant No. 1 while buildings and surplus machinery on a 24-acre site at plant No. 2 will be sold. The H. B. Smith Co. first operated plant No. 1 in 1853 and in 1860 became the pioneer manufacturer of cast iron boilers and radiators by developing the patents of Samuel Gold.

FABRICATED STEEL

. . . Lettings decline to 6500 tons from 18,800 tons last week.

o o o

. . . New projects in better volume at 22,600 tons as against 13,450 tons a week ago.

o o o

. . . Plate awards only 800 tons.

NORTH ATLANTIC STATES

Monroe, N. H.-Barnet, Vt., 310 tons, Connecticut River bridge, to Lackawanna Steel Construction Corp., Lackawanna, N. Y.

New York, 150 tons, coal bunker, Jacob Ruppert Brewery, to Gifford-Wood Co., Hudson, N. Y.

New York, 245 tons, curb angles for Procurement Division, Treasury Department, to Bethlehem Steel Co.

Southold, L. I., 130 tons, grade and high school, to Dreier Structural Steel Co., New York.

Canaseraga, N. Y., 150 tons, central school, to Rogers Steel Co., Corry, Pa.

Elizabethport, N. J., 830 tons, Humbolt Avenue railroad bridge, to Bethlehem Steel Co.

Pittsburgh, 110 tons, building, Kraft-Phenix Cheese Corp., to Bethlehem Steel Co.

SOUTH AND SOUTHWEST

Mobile, Ala., 300 tons, building for National Gypsum Co., to Rogers Steel Co.

Clarke County, Miss., 290 tons, bridge, to Virginia Bridge Co., Roanoke, Va.

Okfuskee County, Okla., 380 tons, bridge, to J. B. Klein Iron & Foundry Co., Oklahoma City.

Dilia, N. M., 128 tons, Pecos River highway bridge, to American Bridge Co.

CENTRAL STATES

Detroit, 555 tons, additions, Chrysler Corp. East Jefferson Avenue plant, to Whitehead & Kales Co., Detroit.

Detroit, 300 tons, power house, Briggs Mfg. Co., to Whitehead & Kales Co.

Warren, Ohio, 630 tons, building for Sunlight Electric Division, General Motors Corp., to R. C. Mahon Co., Detroit.

Cleveland, 100 tons, moving picture theater at Miles Avenue and East 131st Street, to Fort Pitt Bridge Works Co., Pittsburgh.

Toledo, Ohio, 120 tons, National Supply Co., addition, to Donavan Wire & Iron Co., Toledo.

Keokuk, Iowa, 150 tons, Poiree Dam trestle, to Worden-Allen Co., Milwaukee.

Sterling, Ill., 350 tons, warehouse, to Clinton Bridge Works, Clinton, Iowa.

Blairsville, Ill., 245 tons, bridge, to St. Louis Structural Steel Co., St. Louis.

Princeton, Ill., 200 tons, power plant, to Clinton Bridge Works.

Streator, Ill., 165 tons, addition to No. 1 factory, Owens-Illinois Glass Co., to Pittsburgh Bridge & Iron Works, Pittsburgh.

WESTERN STATES

Prowers-Baca Counties, Colo., 314 tons, highway work; 182 tons to Minneapolis-Moline Power Implement Co., 132 tons to American Bridge Co.

Garfield County, Colo., 200 tons, two bridges, to Midwest Steel & Iron Works Co., Denver.

Terminal Island, Los Angeles, 135 tons, naval supply depot hangar, to Minneapolis-Moline Power Implement Co., Minneapolis.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Rochester, N. H., 600 tons, high school, previously reported as 300 tons.

Stockbridge, Mass., 200 tons, music shed.

Stoors, Conn., 230 tons, library building, Connecticut State College.

New York, 2500 tons, including unstated tonnage of reinforcing steel marine amphitheater and exhibit building, World's Fair. Sloan & Robertson, New York, architects.

New York, 600 tons, post office.

Livingston Manor, N. Y., 550 tons, school.

Neville Island, Pittsburgh, 1800 tons, manufacturing building, Kelsey-Hayes Co.

Polk, Pa., 400 tons, infirmary, piggery and tunnel, Polk State School.

New Castle, Pa., 1400 tons, steam plant addition, Pennsylvania Power Co.

Cambridge Springs, Pa., 200 tons, building for Alliance College.

THE SOUTH

Lexington, Ky., 150 tons, store building, Montgomery Ward & Co.; bids in.

Clemson, S. C., 800 tons, textile building.

CENTRAL STATES

Detroit, 1500 tons, tool and die shop, Ford Motor Co.; Giffels & Vallet, Inc., architect; L. Rosetti, associate architect; bids after Nov. 22.

Bay City, Mich., 800 tons, Commonwealth & Southern power house.

Essexville, Mich., 1500 tons, steam plant addition, Consumers Power Co.

Iron Mountain, Mich., 110 tons, Junior High School.

Kalamazoo, Mich., 1500 tons, power plant.

Newcastle, Ind., 1000 tons, power plant.

Fort Wayne, Ind., 500 tons, Central Catholic High School, Cardinal Mundelein.

Akron, Ohio, 200 tons, East Market Street grade crossing elimination; bids taken.

Cincinnati, 600 tons, building, Procter & Gamble Co.

Emerson, Iowa, 440 tons, State bridge.

Burlington, Iowa, 600 tons, J. I. Case Co. warehouse.

Chicago, 150 tons, Socony-Vacuum Oil Co. building.

Brookings, S. D., 230 tons, State overhead crossing.

WESTERN STATES

Colorado Springs, Colo., 300 tons, bridge for El Paso County.

Parco, Wyo., 110 tons, Seminoe Dam gates, Specifications 990-D, Bureau of Reclamation.

Boulder City, Nev., 110 tons, supporting structures, Specifications 989-D, Bureau of Reclamation.

Twin Falls, Ida., 100 tons, Bickel School; Enoch Chytruas, Salt Lake City, general contractor.

Barstow, Cal., 140 tons, high school; bids opened.

Grant County, Ore., 184 tons, highway bridge; bids taken Nov. 30.

Wahkiakum County, Wash., 220 tons, highway bridge; bids Nov. 30.

Skykomish, Wash., 248 tons, highway bridge; bids Nov. 30.

FABRICATED PLATES

AWARDS

Cranston, R. I., 100 tons, three settling tanks, to Bethlehem Steel Co.

Houston, Tex., 500 tons, Texas & Stanolind Co. tanks, to National Tanks Co., Houston.

Parco, Wyo., 200 tons, penstocks for Bureau of Reclamation, to Treadwell Construction Co., Midland, Pa.

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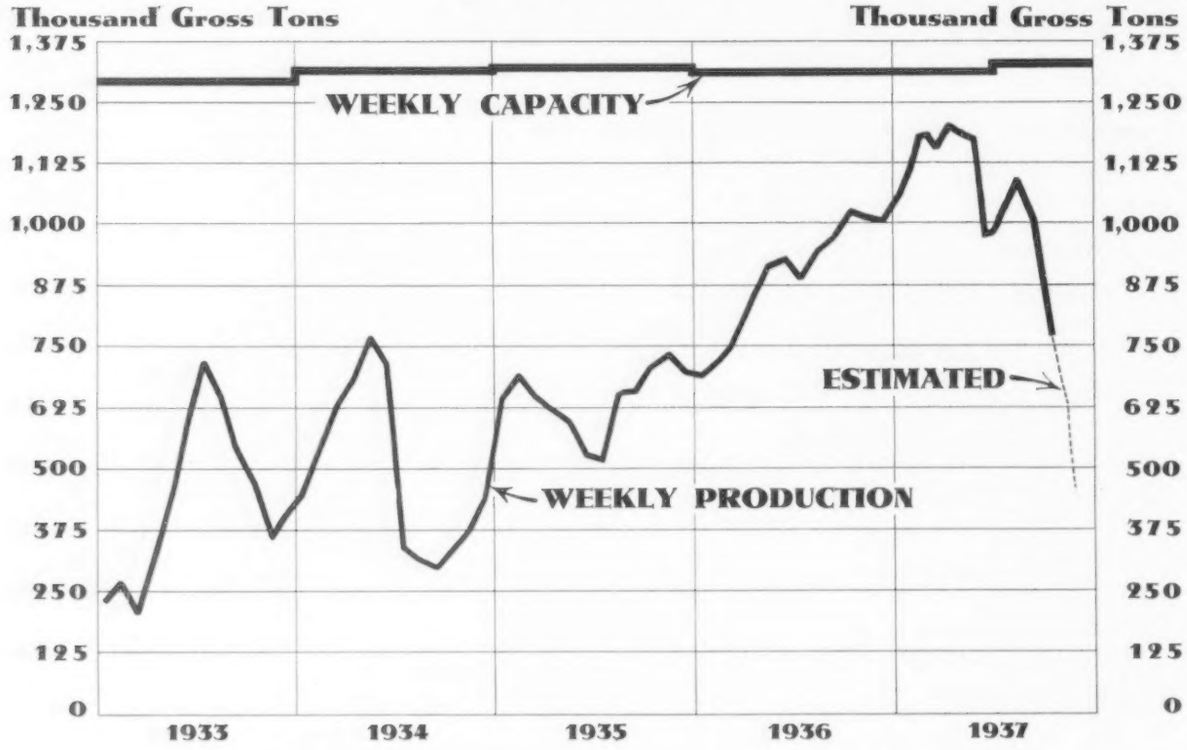
175 A.S.T.E. Members Hear Talk By Spicer

DISCUSSION of the standardization work of the American Standards Association Sectional Committee on Small Tools and Machine Tool Elements featured the address of C. W. Spicer, vice-president of the Spicer Mfg. Corp., Toledo, Ohio, at a recent joint meeting of Detroit and Toledo chapters of the American Society of Tool Engineers at Detroit. Mr. Spicer described the origin and functions of A.S.A. and illustrated its work with slides. Approximately 175 A.S.T.E. members heard the talk.

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1937



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week
Pittsburgh	26.0	35.0
Chicago	30.5	27.5
Valleys	30.0	34.0
Philadelphia	38.0	40.0
Cleveland	29.0	18.0
Buffalo	21.5	28.0
Wheeling	55.0	63.0
Southern	46.0	46.0
Ohio River	27.0	27.0
Western	55.0	45.0
St. Louis	25.0	31.0
Detroit	58.0	58.0
Eastern	50.0	50.0
Aggregate	33.0	35.0

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	Nov. 23, 1937	Nov. 16, 1937	Oct. 26, 1937	Nov. 24, 1936	1937	1936
Fabricated structural steel awards	6,500	18,800	23,400	18,365	975,585	948,395
Fabricated plate awards	800	0	1,870	1,390	108,790	204,960
Steel sheet piling awards	0	0	0	400	62,615	52,775
Reinforcing bar awards	4,375	3,950	2,700	8,140	278,925	310,630
Total Lettings of Construction Steel	11,675	22,750	27,970	28,295	1,425,915	1,516,760

. . . .SUMMARY OF THE WEEK. . . .

▼ ▼ ▼

. . . Upturn in production at Chicago first break in continuous decline.

o o o

. . . Slight improvement in buying has not spread to all districts.

o o o

. . . Automobile industry to go on shortened schedules in December.

STEEL ingot production this week is estimated by THE IRON AGE at 33 per cent of capacity, two points lower than last week but two points higher than the American Iron and Steel Institute estimate of 31 per cent on Monday. For the first time since the week before Labor Day, the decline has apparently been halted at Chicago, where both production and consumption of steel is more widely diversified than in other industrial areas. Ingot output has risen three points at Chicago to 30½ per cent. Of the five major producers in that district, two report higher operations, two remain at last week's rate and the other shows a decline.

In the Cleveland-Lorain district there has been an even sharper increase, from 18 to 29 per cent, but this is mainly due to resumption of operations at two Cleveland plants that were idle last week while awaiting an accumulation of orders. As these plants may operate intermittently until business has definitely forged ahead, this gain possibly has less significance than the improvement at Chicago.

There has been no further decline at Detroit, which is at 58 per cent; in southern Ohio, where the average rate is 27 per cent, or in the South, where new rail orders have maintained last week's rate of 46 per cent. At Pittsburgh, however, there has been a sharp decline of nine points to 26 per cent, while the Wheeling-Weirton area is off eight points to 55 per cent; the Youngstown area off four points to 30 per cent, eastern Pennsylvania down two points to 38 per cent, Buffalo is 6½ points lower at 21½ per cent, and St. Louis off six points to 25 per cent.

WHILE the evidence at Chicago of a slight upturn in new business does not carry through the entire steel industry, some segments of which are still experiencing a downward trend in orders, there is a spotty improvement which at a time like this attracts more than ordinary attention.

Singularly, the railroad and construction industries, from which little immediate help had been expected, are prominent in new business and prospects, while the automobile industry, upon which the steel industry's hopes have been pinned for many weeks, is not only taking less steel, but its December production schedules have been revised downward to an extent that promises little aid for the mills unless orders should be placed some time during next month for January shipment. General Motors plants probably will not operate more than 12 days in December; the Chrysler plants 15 days and the Hudson plants 40 to 50 per cent of capacity.

Rail orders have helped out a few mills, particularly that of the Tennessee Coal, Iron & Railroad Co. at Ensley, Ala., which has recently received orders totaling 66,795 tons, of which 20,500 tons for the Louisville & Nashville and 4890 tons for the Nashville, Chattanooga & St. Louis were bought within the past week, giving it a production schedule through February. The Southern Pacific, which has placed only 35,000 tons of its 75,000-ton inquiry, probably will order the remainder soon; the Northern Pacific is expected to distribute orders for 30,000 tons in a week or two, and other roads may come into the market shortly.

In the railroad equipment field the outstanding order in a quiet market is 250 steel frame refrigerator cars, placed by the Northwestern Refrigerator Line with the American Car & Foundry Co. An inquiry for 500 cars by the Delaware, Lackawanna & Western has been withdrawn.

PROSPECTIVE steel construction work is featured by inquiries for four power plants that will require a total of 4800 tons. While the tonnage is not large, some of the work is for public utilities, which have a great deal of construction in contemplation. Steel structures on which bids are called for total 22,600 tons, of which 4500 tons is for a tool and die shop for the Ford Motor Co. A transportation program for Chicago to cost $161,000,000 has been recommended for acceptance. Inquiries and orders for plates and shapes are generally better than for other steel products. The Navy Department may order 22,000 tons of plates this week for battleships.

The policy of buyers to reduce inventories is widespread and is definitely affecting the volume of incoming business. The steel trade believes, however, that some replenishment buying will come next month for January shipment.

Although the downward trend of scrap prices has not halted, a stronger market in Philadelphia, due to dealers' purchases for export, offsets declines at Pittsburgh and Chicago, THE IRON AGE scrap composite price being unchanged at $12.92.

. . . PITTSBURGH . . .

. . . Ingot output declines to 26%; down also at Wheeling-Weirton.

o o o

. . . No evidence yet of a definite upward trend in buying.

o o o

. . . Automotive demand has receded in the past few weeks.

PITTSBURGH, Nov. 23.—Pittsburgh producers have curtailed ingot production sharply this week to 26 per cent of capacity, a loss of nine points from last week. For several weeks ingot operations have been highly irregular and it is expected that this trend will continue over the next month or so. The Wheeling-Weirton district output is off eight points to 55 per cent of capacity.

Total finished steel sales have shown an increase during the past week from the previous period. Most of the improvement is attributed to an increase in tin plate specifications. A large share of these orders is for advance rolling of 1938 requirements.

There is, as yet, however, no concrete evidence of a definite upward trend in steel demand. Aggregate bookings so far this month are still somewhat below those of a month ago.

With consumer buying practices being on a day-to-day basis, it is extremely difficult for steel producers to schedule steel production and finishing mills on an economical basis. Consequently, there are many cases where plants are shut down for a period to accumulate orders.

Contrasted with the drop in orders for other steel products, heavy plate and shape specifications are furnishing substantial support to the present operating rate. Tin plate operations are up about five points this week to 65 per cent.

Pittsburgh Steel Co., Pittsburgh, was awarded 60 miles of the 150-mile industrial fence for an aqueduct at Los Angeles.

Automotive buying has receded considerably during the past few weeks, and the outlook from this source is not as good as it was a month ago.

Raw material markets are weaker. No. 1 heavy melting steel is off 50c. a ton, being quotable at $13 to $13.50.

Pig Iron

New business is no better than a week ago and shipments have fallen off some in recent weeks. Curtailment in the steel ingot operating rate has necessitated more blast furnaces being taken out of operation.

Semi-Finished Steel

Semi-finished steel demand is a trifle better this week. Total specifications, however, are far below the volume placed a few months ago. Current business is for fill-in needs as most non-integrated makers are fairly well stocked.

Bars

Hot rolled bar sales receded some during the past week. Producers have been forced in some cases to shut down bar mills in order to accumulate rollings. Steel-making costs have been increased owing to the wide diversification of orders and sizes, resulting in a comparatively high number of roll changes. Automobile buying has subsided somewhat and miscellaneous demand is exceptionally dull.

Reinforcing Bars

Specifications for concrete bars so far this month are running ahead of the corresponding October period. This situation is due in some measure to depleted jobbers' stocks. Inquiries are fair this week and involve two substantial tonnages of 1200 tons each for U. S. Government flood control projects in Pennsylvania. Awards during the past week were numerous and included one of 1200 tons for a factory building at Peoria, Ill., to Bethlehem Steel Co., and another of 1160 tons for a U. S. Bureau of Reclamation project at Moxee City, Wash., awarded to Knoxville Iron Co., Knoxville, Tenn.

Plates & Shapes

Specifications for structural plates and shapes showed an improvement last week and incoming business so far this month is on a par with that of the corresponding October period. Owing to the sharp curtailment in demand for other steel products, heavy plate and shape specifications are furnishing substantial support to the district's operating rate. Pennsylvania Power Co., New Castle, Pa., will build a steam plant addition taking 1400 tons of structural steel while a manufacturing building for Kelsey-Hayes Co. at Neville Island, Pittsburgh, will require 1800 tons of material. Awards during the past week were somewhat below the number placed during recent weeks.

Tubular Products

Oil-country goods specifications are no better than a week ago and represent fill-in requirements for immediate shipment. Some jobbers have found it necessary to replenish some of their standard pipe stocks and specifications to the mill are slightly larger. Ultimate consumption, however, is unchanged. Some pipe mills have been forced to shut down in order to accumulate orders.

Sheets

Sheet bookings during the past week, if anything, were slightly below those of the previous period. Miscellaneous buying has been further curtailed and lack of automobile purchases is felt by sheet producers. Some shipments have been suspended by customers, however, in most cases a future delivery date has been given. A continuation of labor disturbances at certain automotive plants will undoubtedly result in suspension of sheet orders now scheduled for shipment.

Strip

Hot and cold rolled strip specifications showed no improvement during the past week and if anything were in slightly less volume. Some makers have already had hold-ups from automotive manufacturers due to labor disturbances. Coming at a time when bookings,

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Nov. 23, 1937	Nov. 16, 1937	Oct. 26, 1937	Nov. 24, 1936
Rails, heavy, at mill	$42.50	$42.50	$42.50	$36.37½
Light rails, Pittsburgh	43.00	43.00	43.00	35.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	32.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	32.00
Slabs, Pittsburgh	37.00	37.00	37.00	32.00
Forging billets, Pittsburgh	43.00	43.00	43.00	39.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	2.05
Bars, Chicago	2.50	2.50	2.50	2.10
Bars, Cleveland	2.50	2.50	2.50	2.10
Bars, New York	2.79	2.79	2.78	2.40
Plates, Pittsburgh	2.25	2.25	2.25	1.90
Plates, Chicago	2.30	2.30	2.30	1.95
Plates, New York	2.54	2.54	2.53	2.19
Structural shapes, P'gh	2.25	2.25	2.25	1.90
Structural shapes, Chicago	2.30	2.30	2.30	1.95
Structural shapes, New York	2.5125	2.5125	2.5025	2.16½
Cold-finished bars, P'gh	2.90	2.90	2.90	2.35
Hot-rolled strips, P'gh	2.40	2.40	2.40	1.95
Cold-rolled strips, P'gh	3.20	3.20	3.20	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.60
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.70
Sheets, galv., No. 24, P'gh	3.80	3.80	3.80	3.20
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.30
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	1.95
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.05
Cold-rolled sheets, No. 20, Pittsburgh	3.55	3.55	3.55	3.05
Cold-rolled sheets, No. 20, Gary	3.65	3.65	3.65	3.15
Wire nails, Pittsburgh	2.75	2.75	2.75	2.05
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.10
Plain wire, Pittsburgh	2.90	2.90	2.90	2.50
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.55
Barbed wire, galv., P'gh	3.40	3.40	3.40	2.55
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	2.60
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Nov. 23, 1937	Nov. 16, 1937	Oct. 26, 1937	Nov. 24, 1936
No. 2 fdy., Philadelphia	$25.76	$25.76	$25.76	$22.3132
No. 2, Valley furnace	24.00	24.00	24.00	20.50
No. 2, Southern Cin'ti	23.89	23.89	23.69	20.44
No. 2, Birmingham†	20.38	20.38	20.38	16.88
No. 2, foundry, Chicago*	24.00	24.00	24.00	20.50
Basic, del'd eastern Pa.	25.26	25.26	25.26	21.8132
Basic, Valley furnace	23.50	23.50	23.50	20.00
Malleable, Chicago*	24.00	24.00	24.00	20.50
Malleable, Valley	24.00	24.00	24.00	20.50
L. S. charcoal, Chicago	30.24	30.24	30.04	25.7528
Ferromanganese, seab'd carlots	102.50	102.50	102.50	75.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.
*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.25	$13.75	$15.25	$17.25
Heavy melting steel, Phila.	13.75	12.75	15.25	14.75
Heavy melting steel, Ch'go	11.75	12.25	14.00	16.50
Carwheels, Chicago	14.50	14.50	16.50	16.50
Carwheels, Philadelphia	16.25	16.25	18.25	16.75
No. 1 cast, Pittsburgh	16.25	16.75	17.75	16.25
No. 1 cast, Philadelphia	16.25	16.25	18.25	16.75
No. 1 cast, Ch'go (net ton)	11.50	11.50	12.75	14.00
No. 1 RR. wrot., Phila.	16.25	16.25	18.25	15.75
No. 1 RR. wrot., Ch'go (net)	9.75	10.75	12.00	14.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.25	$4.25	$4.25	$3.75
Foundry coke, prompt	5.00	5.00	5.00	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	10.75	11.00	12.00	10.50
Lake copper, New York	12.125	12.125	13.125	10.62½
Tin (Straits), New York	41.625	43.00	48.50	52.00
Zinc, East St. Louis	5.50	5.75	5.75	5.05
Zinc, New York	5.85	6.10	6.10	5.42½
Lead, St. Louis	4.85	4.85	5.35	5.05
Lead, New York	5.00	5.00	5.50	5.20
Antimony (Asiatic), N. Y.	15.75	16.25	18.25	12.50

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Nov. 23, 1937	2.605c. a Lb.	$23.25 a Gross Ton	$12.92 a Gross Ton
One week ago	2.605c.	23.25	12.92
One month ago	2.605c.	23.25	14.83
One year ago	2.197c.	19.73	16.17
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	$21.92, Mar. 30	$12.92, Nov. 16
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

other than automotive, are at a low point, hold-ups due to labor troubles present anything but an optimistic picture to strip producers.

Tin Plate

Tin plate operations have improved further during the past week. Some of the improvement is due to customers balancing out their stocks while the greater part of the increase is due to advanced rolling of 1938 requirements. Operations are estimated at about 63 per cent of capacity, up slightly from a week ago.

Wire

Awards have been made on 155 miles of industrial fence for the Colorado River aqueduct by the Metropolitan Water District, Los Angeles. Approximately 2600 tons of fencing and posts are involved. Pittsburgh Steel Co., Pittsburgh, will furnish 60 miles, Anchor Post Fence Co., Baltimore, 70 miles, and Los Angeles Fence Co., 25 miles. Demand for manufacturers' wire is off slightly and jobbers are only buying when absolutely necessary.

Coal and Coke

Over 300 beehive coke ovens in the Connellsville region have been taken out of operation during the past few weeks. Most of the curtailment resulted from the shutting down of blast furnaces. Industrial coal demand is at low ebb and stocks held by consumers appear considerably larger than was the case a few months ago before the decline in industrial activity. Demand for domestic coal is not brisk owing to the fact that dealers and customers stocked up somewhat a month ago.

. . . Many small reinforcing steel projects in market.

ST. LOUIS, Nov. 23.—While there are few projects requiring as much as 100 tons of reinforcing bars pending, a leading mill here has inquiries for more than 300 projects that involve from 20 to 40 tons of this material. Most of these jobs are public works projects of some kind, and the total tonnage involved amounts to considerable. Structural fabricators report only a few small projects pending, and no large ones. Steel mills report that buying is exceeding light, consumers going about the business of reducing inventories "with a vengeance."

Demand for pig iron is smallest for some time, and shipments for November are expected to be the lowest of the year. Melters are imbued with a desire to reduce inventories, and even those industries that are busy are following that plan. With prices not likely to advance, melters say there is no incentive to buy. The melt continues to decline. While the agricultural implement plants are conducting their own operations without any recession, outside foundries serving them with parts are curtailing their melt. Stove foundries are operating very little.

Ingot operations in the St. Louis area are down to 22 per cent of capacity.

. . . Public utility to spend $5,000,000 on plants.

SAN FRANCISCO, Nov. 22.—Plans and specifications are being completed by the Pacific Gas & Electric Co., San Francisco, for construction of a $5,000,000 steam generating plant at the Tidewater Associated Oil Co. refinery, Avon, Cal. The oil company has awarded 165 tons of steel for refinery construction in preparation for the generating plant to Gunn Carle & Co., San Francisco, and Independent Iron Works, Oakland, Cal. Bids for the generating plant will be issued shortly.

Call for bids on gates and gate hoists for dams on four Bureau of Reclamation projects brought brisk activity to this division of the western market.

Announcement has been made of bids received by the Metropolitan Water District, Los Angeles, on 1200 tons rolled H-section (alternate pipe), 1180 tons fence fabric, and 150 tons barbed and plain wire material and construction of woven wire fences and gates at certain reservoirs of the Colorado River aqueduct. Anchor Post Fence Co. and Pittsburgh Steel Co. were low bidders on the major portion.

New cast iron pipe projects requiring approximately 2700 tons have been set for bidding. United States Pipe & Foundry Co., San Francisco, was awarded 410 tons of 24-in. pipe by Bellingham, Wash.

. . . Higher freight rates on pig iron do not apply to all points.

BOSTON, Nov. 23.—The Mystic Iron Works has reaffirmed current prices for first quarter shipments. The pig iron market continues very quiet, and in all likelihood will continue so the remainder of 1937 as most domestic melters are well covered based on present rate of operations, and foreign interest has declined again.

All New England states have established new intrastate freight rates showing a general advance of 10 per cent. However, the increased rates apply to approximately 20 per cent of pig iron consumers only. Herewith is given a complete lineup of freight rates now in effect from Everett, Mass., to New England points.

There are no rate increases to Connecticut consuming points or to Port Chester, N. Y., nor to consumers in Rhode Island. There is no increase in any switching rate in the Boston switching district and this, of course, applies to all railroads. This district comprises East Boston, South Boston, Charlestown, Cambridge, Chelsea, Dorchester, Everett, Harrison Square and Roxbury. Other points in Massachusetts on the New Haven Railroad to which there are no increases are: Bridgewater, Brockton, Easton, East Bridgewater, Fair Haven, Fall River, Franklin, Haydenville, Hyde Park, Lee, New Bedford, North Attleboro, Norwood, Plymouth, Randolph, Reedville, Southbridge, South Swanson, Taunton, Walpole, Weir Branch, Whitins, Whitman and Wollaston.

To the following points in Massachusetts, provided cars are loaded with 40 gross tons minimum, the rate of $2.15 per gross ton is unchanged. On less than 40 gross tons, the rate goes up 20c. to $2.65 per gross ton: Athol, Brightwood, Greenfield, Holyoke, Oak Street, Northampton, Orange, Springfield, West Springfield and Westfield. To all other points in New England, including Worcester, the increase in freight rates is effective.

To meet the Mystic Iron Works pig iron delivered prices, Buffalo furnaces as well as those in eastern Pennsylvania will have to absorb certain charges including the increased freight rates.

. . . . CHICAGO . . . .

. . . Ingot rate rises three points to 30½% of capacity.

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. . . Bottom is believed to have been reached at district mills.

o o o

. . . Railroad buying expected to be of some influence soon.

CHICAGO, Nov. 23.—For the first time since the week before Labor Day the downward march of ingot production has been halted and output is up three points to 30½ per cent of capacity. Production at two mills registered increases, two others maintained last week's rate of operations, and one showed a decline.

It may be that the bottom of the current downswing in Chicago mill operations has been reached because output here has not been stimulated by a few large orders, but is instead a reflection of the activity in all types of consuming plants. Orders from farm equipment manufacturers, jobbers and automobile makers constitute the bulk of the business being received. Railroad specifying or buying on the whole is negligible pending the outcome of the petition for higher freight rates, and new construction, although it seems this week to be picking up somewhat, has not yet become an important factor.

Some railroads, however, like the Burlington have come forth with their programs in spite of an uncertain financial future, and others, such as the Northern Pacific, are expected to enter the market within a few weeks. This last road was reported to be considering 30,000 tons of rails a week ago, and it was revealed yesterday that this business actually may be placed within two or three weeks, and that another named road may purchase a tonnage soon also. It is regarded as probable that the remainder of the 75,000 tons of rails inquired for by the Southern Pacific will be placed in a short time. Last week the road ordered 35,000 tons.

The Northwestern Refrigerator Line Co. has ordered 250 40-ton steel underframe refrigerator cars from American Car & Foundry Co. The inquiry of the Delaware, Lackawanna & Western for 500 hopper cars, reported in the Nov. 11 issue of THE IRON AGE, has been cancelled.

With every business day that passes, inventories are running lower, and steel salesmen are of the opinion that this tendency to operate from stock will necessarily be short-lived, and that buying on a fairly widespread scale will be unavoidable within a few weeks. It is pointed out, however, that in some plants where current orders may not be plentiful, stock has been converted into finished merchandise which is still regarded as inventory nevertheless.

Chicago's traction plan, for which money is understood to be available, was revealed in detail to the transportation group this week and its acceptance urged. The $161,000,000 program will include the building of a subway, underground tubes for trolley cars, conversion of elevated structures into super highways, construction of an underground bus storage terminal, substitution of buses for trolley cars on many surface lines, and the modernization of the remaining part of the elevated system.

Heavy melting steel declined 50c. to $11.50 to $12 a ton this week. Trading is at a standstill and prices are nominal.

Pig Iron

Shipments of pig iron, which already for the first 20 days of November are off some 18 per cent from October are estimated to be down 20 per cent for the entire month. Foundry coke movement thus far is down only 5 per cent, indicating a fair maintenance of melt in the district. No improvement has been made in blast furnace activity. Spot sales are insignificant. Foundries, with the exception of those melting for machine tools, farm implements and tractors, are operating at only a fair rate.

Structural Shapes and Reinforcing Bars

The past week was the most productive as concerns shape awards and inquiries of any for the past several weeks. The list of inquiries reported is unusual in that not a single public job is included, all except a Catholic school being industrial projects. The largest job in this district at the moment is the Mississippi River bridge at Lacrosse, Wis., requiring 3100 tons of shapes. Reinforcing bar activity is slight and prices continue weak.

Plates

Tank makers are fairly well occupied, although their activity is mostly confined to light tanks. Railroad buying continues negligible, and delivery is possible within a week. A resumption of railroad purchasing is still expected following the granting of rate increases, with a possibility of some buying being seen before then.

Bars

Specifications from automobile plants are still lagging, and forgers not being particularly active, bar sellers are mostly dependent upon the farm equipment trade for business. Deliveries can be made in one to two weeks.

Sheets

Orders from motor car makers have not yet picked up to any extent and delivery on all grades of sheets in less than three weeks is not difficult. Automobile demand, however, still is mostly responsible for the work on hand, with requirements for stoves, refrigerators, etc., helping to a lesser degree.

Wire and Wire Products

Demand from motor car plants is not improving but specifications from jobbers and farm equipment manufacturers are being maintained. Rural interest in fencing and other merchant wire products is not expected to develop before Feb. 1, but a good volume of business is anticipated by sellers throughout the spring unless farm legislation interferes.

. . . CINCINNATI . . .

. . . *Further decline in demand for sheets.*

CINCINNATI, Nov. 23.—Bookings of sheets the past week declined from the level of the preceding period, mills reporting less than 25 per cent of capacity demand. Automotive ordering is light. Miscellaneous users move more conservatively, bringing their demand within narrow limitations.

Production in this area is being curtailed to a level near that of demand. The Zanesville unit of American Rolling Mill Co., however, is exceptional at 60 per cent.

Pig iron business is quiet. Small ordering in carload lots makes up current new business. Most melters under contract specified heavily before effective dates of new freight rates, thus bringing current shipments downward. Foundry operations in all but machine tool plants are slow, averaging about 40 per cent.

Foundry coke shipments are unchanged as foundry consumption fails to move upward.

. . BIRMINGHAM . .

. . . *Rail buying brightens prospects; L & N orders 20,500 tons.*

BIRMINGHAM, Nov. 23.—Rail buying last week brought new life to the steel market and brightened prospects for the next few months. During the week orders for a total of 53,795 tons of rail were announced for the Tennessee Coal, Iron & Railroad Co. Southern Pacific bought 20,405 tons; Louisville & Nashville, 20,500 tons. Nashville, Chattanooga & St. Louis, 4890 tons. An additional export order of 8000 tons, from an unnamed purchaser, was also received. Including the 13,000-ton order from the Manchurian Railways, on which the Ensley rail mill is now working, 66,795 tons of rail are now on hand for the Ensley mill. These new orders assure steady operations through February. Other tonnage is also expected, now that the rail buying season has actually opened.

Steel operations apparently will not recede further. Two weeks ago the low point of the year was reached when only 10 open hearths were operated. Last week there were 11 in production and the same number is scheduled for this week.

Fifteen blast furnaces are active. The Tennessee company blew in Fairfield No. 6 last week to partly offset the loss of two furnaces the preceding week.

General steel buying is still light. Likewise pig iron shipments are not showing much improvement.

Algernon Blair, Montgomery, Ala., has been awarded the contract for the construction of five service buildings at the tin plate mill of the Tennessee Coal, Iron & Railroad Co.

. . CAST IRON PIPE . .

Seaside Heights, N. J., plans about 300 ft. of 8-in. and 18,000 ft. of 6-in. for water system, replacing existing wooden pipe lines.

Wheeling, W. Va., has let contract to United States Pipe & Foundry Co., East Burlington, N. J., for cast iron pipe and fittings at $36,052, for installation in Edgewood and Woodsdale districts.

Lafayette, Ala., closes bids Nov. 27 for about 19,000 ft. of 8-in. for main water line; also for pumping station and filter plant. Fund of $48,000 has been arranged through Federal aid. R. L. Totten, 3075 Peachtree Road, Atlanta, Ga., is consulting engineer.

Butler, Ky., closes bids Nov. 27 for 9868 ft. of 2 to 6-in. for water system; also for 50,000-gal. elevated steel tank and tower, turbine pumping machinery and other waterworks equipment. John T. Gillig, Walton Building, Lexington, Ky., is consulting engineer.

Port Arthur, Tex., has revised plans for main 12-in. water line, with distributing lines and other waterworks installation. Cost about $110,000. M. D. Gates, Port Arthur, is engineer.

Brownwood County Water Improvement District No. 1, Brownwood, Tex., will take bids soon for pipe for water system in Lake Brownwood area. Financing is being arranged through Federal aid.

Ruston, La., plans pipe lines for water system; also pumping stations and other waterworks installation. S. J. Voorhees & Associates, Dalyrample Drive, Baton Rouge, La., are consulting engineers.

Bolivar, Ohio, will take bids soon for pipe lines and other waterworks installation. Cost about $40,000, of which $14,000 will be represented by bond issue, recently voted.

Mountain View, Mo., will place awards soon for pipe lines for water system, pumping machinery and other waterworks installation. Beard Engineering Co., 2606 Oakview Terrace, Maplewood, Mo., is engineer.

Belton, Mo., plans about three miles of 6-in. for main water line from connection with system of Jackson County Public Water District No. 1 to municipal limits. Financing is being arranged through Federal aid. Charles A. Haskins & Co., Finance Building, Kansas City, Mo., are consulting engineers.

Kennedy, Minn., plans pipe lines for water system, including main line about four miles from water source to municipal limits. Fund of $80,000 has been secured through Federal aid for this and other waterworks installation. H. T. Smith, 913 Almonte Street, Grand Forks, N. D., is consulting engineer.

Three Forks, Mont., plans 1½, 1 and ¾-in. for replacement of present mains in different parts of municipality. Fund of $58,000 is being arranged for this and other waterworks installation, of which $32,000 will be represented by bond issue. F. F. Palmer, Forsyth, Mont., is consulting engineer.

Bellingham, Wash., has awarded 410 tons of 24-in. to United States Pipe & Foundry Co., San Francisco.

La Mesa, Lemon Grove and Spring Valley Irrigation District, La Mesa, Cal., asks bids until Dec. 14 on 939 tons of 4, 6, 8 and 12-in. pipe.

Redding, Cal., asks bids on 195 tons 18-in.

Seattle will ask bids Dec. 2 on 1175 tons 8-in. centrifugal cast-iron or transite pipe.

Vancouver, Wash., will ask bids Dec. 6 on 6 to 16-in. pipe, alternate cast iron, transite or welded steel, and 72,000 lb. of fittings.

. . . . BUFFALO . . . .

. . . *Blast furnace activity reduced.*

BUFFALO, Nov. 23.—Reductions in the number of active blast furnaces and open hearth furnaces are noticeable this week following recessions late last week and over the week-end. Bethlehem's Lackawanna plant is now operating three blast furnaces; Hanna Furnace Corp. has reduced its active stacks to two; Republic has two blowing, and the Tonawando blast furnace is active. The Wickwire-Spencer stack is banked.

Bethlehem's Lackawanna plant closed its No 3. battery over the week-end, and temporarily was down to three active open hearths, but three additional have been placed in operation in No. 1 battery, making the active figure for the week, six. The net loss from last week is the output of one furnace. Republic Steel Corp., has cut its active list from five to three and the Wickwire-Spencer ingot-making unit is down.

Bethlehem's big strip mill was in operation at the beginning of the week, but prospects were that this would not run more than two days.

Operations are reflecting order books, and there is very little demand for finished material.

. . . CLEVELAND . . .

. . . Operations up in Cleveland-Lorain area, down at Youngstown.

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. . . No improvement in volume of incoming business.

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. . . Ore shipping season ends this week with movement of 62,500,000 tons.

CLEVELAND, Nov. 23. — Ingot output advanced 11 points to 29 per cent of capacity in the Cleveland-Lorain district this week as a result of the starting up of six open hearth furnaces in two Cleveland steel plants that had been completely shut down. Operations were resumed to fill some orders that had accumulated during the shutdown. In the Youngstown district there was a further four point decline to 30 per cent of capacity.

Incoming business in finished steel is maintaining the same volume as during the previous few weeks. Some of the mills report that their business is down about 25 per cent as compared with October but they are getting about as many orders as when their business is normal. However, as purchases are of a hand-to-mouth character, all orders are small.

Consumers who usually buy in lots of sufficient size to obtain the quantity differentials are not taking advantage of the quantity deductions. Some consumers already have made rather drastic reductions in their inventories, but others still have stocks that will carry them through the year or longer. The policy of buyers, including automobile manufacturers, to get their inventories down to low points is widespread and is due in part to the taxes assessed on inventories Jan. 1 in this and some adjoining states.

Demand for finished steel from the motor car plants shows no revival, although some mills are making fair shipments of sheets to motor car plants against orders booked several weeks ago.

The ore shipping season is scheduled to end this week with a water movement of close to 62,500,000 tons. An interesting development in the ore market was the shipment of a cargo of eastern New York ore to a Cleveland steel plant this week.

Pig Iron

New demand is light and of a hand-to-mouth character. Foundry inventories are being further reduced and it is claimed that more iron is being consumed than is being shipped. While consumers are cutting down inventories, producers are avoiding building up their inventories by curtailing production to shipments. With the banking of furnaces and the slowing down of production by stacks still active, a leading merchant furnace interest is now operating at approximately 50 per cent of capacity.

Sheets and Strip

Although the slightly improved demand for sheets from consumers in this territory noted a week ago is still in evidence, the volume of business continues very light. Automobile plants are taking shipments against orders placed some time ago but are reducing their inventories and the new commitments they are making are for small lots. Some of the stove manufacturers have fair stocks but are using them up rather slowly, as they have curtailed production. Consumers are buying only in small lots for early needs and call for prompt shipment. Some new tonnage in hot rolled strip was placed during the week by integrated cold rolling plants supplying the automotive industry. However, no new releases for either hot or cold rolled strip are coming from some of the large consumers in that field who are cutting down inventories.

Iron Ore

A cargo of 3000 tons of Eastern ore was received Monday at the Corrigan, McKinney plant of the Republic Steel Corp. from the mines of the Witherbee Sherman Corp. near Port Henry, N. Y., operation of which has been taken over by the Republic Steel Corp. pending conclusion of a 25-year lease of those mines by Republic. Ore men cannot recall that any Eastern ore had previously been shipped to Cleveland. Anyway, it was the first shipment of New York state ore into this port in many years. This ore, which has a high iron content, was shipped from Port Henry by barge through the New York ship canal to Oswego, N. Y., where it was loaded into a Lake freighter which brought the cargo to Cleveland.

With very few cargoes still to be moved, the ore shipping season is expected to close before the end of the week. The November movement will be around 1,250,000 tons. The shipping season at Ashland, Wis., has closed with a movement this year of 5,651,879 tons.

Consumption of Lake Superior ore in October amounted to 4,203,873 tons, a decrease of 953,558 tons from September, according to the monthly report of the Lake Superior Ire Ore Association. Ore used in October last year amounted to 4,384,809 tons. Furnace stocks Nov. 1 were 37,209,855 tons and stocks at furnaces and Lake Erie docks on that date were 43,266,427 tons. This is an increase of 8,110,328 tons over the amount on hand Nov. 1 last year. There were 120 furnaces using Lake ore in blast Oct. 31, a decrease of 28 for the month.

Bars, Plates and Shapes

Demand for merchant bars shows no improvement. Orders are confined to small lots for immediate needs. Demand for structural shapes has taken a little spurt, but the gain may be only temporary as fabricators are not figuring on much work. Awards include 650 tons for a General Motors extension at Warren, Ohio. Bids have been taken for a grade crossing elimination bridge in Akron requiring 200 tons. Bids for piers for the Main Avenue bridge, Cleveland, will be taken shortly, and it is expected that the contract for the bridge will be placed early in the year. Plans just approved call for structural steel construction. While preliminary estimates indi-

cate that this bridge will take a minimum of 5000 tons of structural shapes, the tonnage required may be considerably larger. Plates are in fair demand from Akron manufacturers of tire making machinery. Bids will be taken tomorrow for a warehouse for the Lazarus store in Columbus requiring 900 tons of reinforcing bars.

. . . Mills booked fairly well to end of year.

TORONTO, Nov. 23.—Steel producers are obtaining fair bookings to the close of the year and have not opened books for first quarter contracts. The automotive industry is maintaining steady operating schedules but has not got under full swing on 1938 car models. Agricultural implement industry is holding to a high level with good demand reported for export.

Pig iron sales show little variation from preceding few weeks.

Heavy melting steel and turnings have a regular call from the mills in the Hamilton district.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until Nov. 30 for 400 lin. ft. of 4-in. galvanized welded steel pipe and 400 lin. ft. of 1½-in. similar pipe (Circular 380).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 7 for steel pipe and steel tubing; also cast iron and wrought iron pipe (Schedule 2135).

Gas Corp. of Michigan, Inc., Mount Pleasant, Mich., plans extensions in welded steel pipe lines to new gas source in State gas field, now being developed, for natural gas transmission to Mount Pleasant, where local distribution will be carried out in existing lines. Present gas source of company has been depleted, and pending establishment of new supply, permission has been obtained to secure natural gas from Consumers Power Co., and welded steel pipe lines will be built to tap this source.

Imperial Oil, Ltd., 56 Church Street, Toronto, Ont., plans two new 4-in. welded steel pipe lines to form loops with two existing pipe lines from Turner Valley oil district to Calgary, Alta., for crude oil transmission to refinery at last noted place increasing line capacity from 13,000 to 17,000 bbl. per day. Pumping stations will be installed for booster service.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Neb., plans pipe line system for gas distribution in recently established District No. 830. T. A. Liesen is secretary.

Sabinal, Tex., asks bids until Nov. 30 for pipe lines for municipal gas distribution. Cost about $35,000. Financing has been arranged. Joseph J. Rady, Majestic Building, Fort Worth, Tex., is consulting engineer.

Texhoma, Okla., has engaged Frank E. Devlin, W-K-H Building, Wichita, Kan., consulting engineer, to make surveys and estimates of cost for a municipal natural gas pipe line distribution system and control station. A bond issue will be arranged.

Continental Oil Co., Ponca City, Okla., has awarded contract to J. F. Pritchard & Co., Billings, Okla., for about 22 miles of 4 to 20-in. Lindewelded pipe line.

White Deer Pipe Line Construction Co., Oklahoma City, has been awarded contract for about 30 miles of gathering pipe lines in connection with a gasoline plant to be built for Barnsdall Oil Co., near Odessa, Tex. About 27 miles of 2 to 10-in. pipe will be Lindewelded.

Oklahoma Natural Gas Co., North Harvey Street, Oklahoma City, Okla., has authorized extensions in welded steel pipes in different parts of municipality, totaling close to 200,000 ft. in all. Work will be carried out by company forces. Cost about $375,000.

PERSONALS

FRANK J. BOEHM and WILLIAM F. GRANNEMAN, who were formerly with the Brooklyn branch of Steel & Tubes, Inc., subsidiary of Republic Steel Corp., have organized the Standard Tube Sales Corp., 1 Admiral Avenue, Long Island City, which has become the Eastern exclusive sales agent for the Standard Tube Co., Detroit, manufacturer of seamless and welded steel tubing and boiler tubes. Mr. Boehm, who was New York district sales manager of Steel & Tubes, Inc., has been associated with the Jackson Tube Co., Brooklyn, for the past year.

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T. F. MYNERS has been named general superintendent of the Witherbee Sherman ore properties at Minersville and Fort Henry, N. Y., which were recently put under the management of Republic Steel Corp.

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RAYMOND F. HERR has been appointed export manager of the Harnischfeger Corp., Milwaukee, to succeed FREDERICK SALDITT, recently appointed vice-president in charge of sales. Mr. Herr joined the firm upon his graduation from Purdue University in 1930, and recently has been assistant export manager.

Koppers Awarded Armco Contract

Calvin Verity, vice-president of American Rolling Mill Co., Middletown, Ohio, has announced construction of 15 new coke ovens at an estimated cost of $500,000, to be built at the company's Hamilton, Ohio, blast furnaces by the Koppers Co., Pittsburgh. Construction of the ovens, to be of the Becker low differential under-jet type, will be completed in about 10 months.

Congress Urged To Probe Coal Board

WASHINGTON, Nov. 23.—Congressional investigation of the National Bituminous Coal Commission was asked on Monday by Representative Byron T. Scott, Democrat of California, who introduced a House resolution based on charges made by George E. Acret, former member of the commission, that the "incompetently administered" coal board was becoming "a national scandal."

SEC Rules Sheet & Tube Beyond Utility Act

YOUNGSTOWN SHEET & TUBE CO. has been granted exemption from the Public Utility Holding Company Act in a ruling by the SEC that the company's ownership of 387,778 common shares of the Rio Grande Valley Gas Co. (taken as part payment for pipe sold in 1927) does not place it within the act.

Youngstown's gross revenues in 1936 were $105,828,748 while gross revenues of the utility for that year were but $7,000, the SEC said.

$100,000 Fines Asked In War Scrap Exports

WASHINGTON, Nov. 23. — Representative Boren, Democrat of Oklahoma, has introduced a measure barring the exportation of scrap, pig iron, iron ore and finished steel to any nation at war. He would plaster a penalty of $100,000 or imprisonment—or both—for violation. The bill has been referred to the House Committee on Military Affairs.

. . . . NEW YORK. . . .

. . . Buying shows a slight improvement but volume is still very low.

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. . . Users expected to order a little more freely soon for January.

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. . . Inquiries for shapes and plates are more numerous.

NEW YORK, Nov. 23.—Incoming steel business is not getting any worse; in fact, in some spots it is a little better, but not enough to indicate an immediate reversal of trend. What is happening probably is that some consumers are getting a little nearer to the end of their stocks, making replenishment necessary. The fact that nearly all orders call for the earliest possible shipment points in the direction of a gradual reduction of inventories.

While steel sales people are not entertaining hopes for a sharp pick up in demand in the near future, they are beginning to believe that new buying probably will show an improvement by the middle of December, when some orders may be placed for shipment after Jan. 1. Some steel users, while not placing any orders of consequence at the moment, have stated that they will probably buy some steel for January delivery.

Inquiries for structural steel and plates were more numerous in the past week than in the week before.

Pig Iron

Liquidation of inventories and declining melting schedules continue to keep purchases very light. Foundry operations, currently estimated at between 30 and 40 per cent of capacity, have dropped sharply over the past two weeks and outside of foundries supplying machine tool parts, two or three days per week at greatly reduced heats is the casting program for most plants in this district. Foreign machinery orders account for the work that is keeping machine tool castings suppliers active. Shipments, which are running about 15 per cent below the October average, are the only bright spot in the market. In the export field small inquiries are fairly numerous, but little actual ordering is being done.

Reinforcing Bars

A few highway and railroad crossing jobs and several small buildings, all taking less than 100 tons of bars, are the only open jobs at present. Structural steel on the Humbolt Avenue bridge project in Elizabethport, N. J., has been placed, but 84 tons of bars are yet to be awarded. Centaur Construction Co., New York, is general contractor. Inquiries for a small tonnage for the marine ampthitheater at the World's Fair will be issued early in December.

Plates and Sheets

Plate business is lower, if any change at all is discernible. A small tonnage came from railroad sources for repair work but it hardly points to a distinct trend toward further expenditures in that direction on any large scale. Small fabricators are busy estimating jobs. Past experience, however, has shown that only a fraction of this paper work develops into jobs and orders for steel. Sentiment in the trade is bearish, and sellers see no immediate sources from which new business will come.

Sheet orders are still confined to small lots and the talk of the trade is in thousands of pounds and numbers of sheets rather than in any tonnages. Jobbers are finding the going slow in working off their large inventories. Most hopeful bit of news that has significance for this branch of the industry is the announcement of a $10,000,000 garden apartment project in the Riverdale section of the city. Recession in building activity has largely limited the outlet for galvanized sheets and similar items in this district.

REINFORCING STEEL

. . . Awards of 4375 tons —4275 tons in new projects.

AWARDS

Elizabethport, N. J., 100 tons, railroad crossing elimination, to Igoe Brothers, Newark, N. J.

Syracuse, N. Y., 100 tons, Charles Andrews Junior High School, to Bethlehem Steel Co.

Bucks County, Pa., 130 tons, highway bridge, to Bethlehem Steel Co.

Detroit, 100 tons, group four sewage regulation chambers, to Bethlehem Steel Co.

Chicago, 350 tons, building, Regensteiner Corp., to Inland Steel Co., Chicago.

Chicago, 275 tons, 105th Street bridge, to Calumet Steel Co., Chicago.

Chicago, 150 tons, Robert Waller High School, to Bethlehem Steel Co.

Broadview, Ill., 160 tons, viaduct superstructure, to Inland Steel Co.

Peoria, Ill., 1200 tons, Hiram Walker building, to Bethlehem Steel Co.

State of Illinois, 100 tons, highway work, to Calumet Steel Co.

Minneapolis, 150 tons, health building, University of Minnesota, to Ceco Steel Products Corp., Omaha, Neb.

West Fargo, S. D., 175 tons, building, Armour & Co., to Paper-Calmenson Co., St. Paul.

Moxee City, Wash., 1160 tons, Bureau of Reclamation, to Knoxville Iron Co., Knoxville, Tenn.

Skagit County, Wash., 225 tons, bridge, to Pacific Car & Foundry Co., Seattle.

NEW REINFORCING BAR PROJECTS

South Boston, 108 tons, Edison Co. plant superstructure.

Baltimore, 800 tons, Sears, Roebuck & Co. warehouse; bids in.

Armstrong County, Pa., 1200 tons, Crooked Creek dam, United States Engineers, Pittsburgh.

Forest County, Pa., 1200 tons, Tionesta reservoir, United States Engineers, Pittsburgh.

Washington, 100 tons, Rock Creek bridge.

Detroit, 275 tons, apartment building.

Fargo, N. D., 100 tons, State highway bridge.

St. Louis, 200 tons, addition to Masonic Home; Boaz-Kiel Construction Co., St. Louis, general contractor.

Los Gatos, Cal., 155 tons, highway work; bids Dec. 8.

Los Angeles, 135 tons, Fox Studios bridge; bids Dec. 8.

. . PHILADELPHIA . .

. . . Operations drop two points further to 38 per cent.

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. . . Current order volume equals October average.

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. . . Plate outlook slightly improved; shapes listless.

PHILADELPHIA, Nov. 23.—Pencoyd has put on an additional open hearth and is now operating four units. Additional retrenchment in other district mills has, however, served to force the eastern Pennsylvania rate down two more points to 38 per cent of capacity. This rate may be compared with the 55 per cent rate in effect for the same period a year ago, and it is necessary to go back to December, 1935, to find a period in which this district was as inactive as it is at the present time.

Nothing short of a world upheaval could inject much life into this district over the remainder of the year. The best sellers are hoping for is a moderate recovery in demand early in January. In fact, the business recession has so slowed up makers of consumer goods here within the past fortnight that the reduction in steel inventories is not keeping pace with expectations, and the result may be a lag in the buyers return to the steel marts until late February.

One slightly encouraging observation is that at least several mills are converting raw steel at a moderately better rate than open hearths operations would indicate. Although some fair quantities of ingots were stocked during the downward curve of business, this backlog is being liquidated slowly. Thus it would seem that with the slightest encouragement the district operations could rebound at least 5 to 10 points, particularly after the holiday and inventory periods.

Pig Iron

With foundry operations down considerably and melters wedded to the policy of covering only immediate needs, all furnaces are finding it difficult to dispose of their weekly production. The result has been a moderate accumulation at furnaces, although this stocking is minimized to some extent by a continued flow of iron to foreign users and the policy of many companies of taking units out of production shortly after sales support falls off. Although prices have been shaded on new foreign business, the domestic level continues to be very firm, and is expected to remain so over the turn of the year. The acquisition of the Witherbee Sherman properties by Republic Steel Corp. will quite likely inject still another strong competitor for the merchant business in this area.

Sheets and Strip

Demands of auto body stamping plants continue to fall considerably under expectations. Jobber buying is confined to small fill-in lots, and miscellaneous orders, although fairly numerous, account for no great total amount of tonnage. All producers are badly in need of orders to round out rolling schedules and are scouring the district for releases with but little success. Prices continue to hold steady, but a cynic might point out that it has been many months since any inquiry in this area has been sufficiently attractive to whip up the competitive instinct in sellers.

Plates and Shapes

The shapes market was particularly lifeless during the week, with no award of over 100 tons and no new inquiry of any moment. Reinforcing bars were likewise practically inactive, the only award being for 130 tons for a highway bridge in Bucks County and the only active tonnage of any size being for 800 tons for a Sears, Roebuck & Co. warehouse in Baltimore. Day-to-day turnover in plates continues at a low level, although several projects up for bidding may mean added business to district producers. The War Department is asking bids on a 308-ft. sea-going barge on Dec. 15, and Standard Oil Co. of New Jersey is calling for tenders on one to four tankers early in December, each of which will require about 5000 tons of hull plates, bars, shapes and bulb angles. Analysis of bids taken about a week ago for the 22,000 tons of bars, plates, shapes, strip and sheets for the battleships *North Carolina* and *Washington*, his disclosed the Central Iron & Steel Co. is low on a sizable portion of the plate requirements and Republic is low on the largest bar inquiries.

Imports

Imports during the past week at this port: chrome ore from South Africa, 2500 tons; pig iron from British India, 1248 tons; wire rods from Sweden, 42 tons; steel tubes from Sweden, 99 tons; steel forgings from Sweden, 55 tons; steel bars from Sweden, 45 tons; steel bars from Belgium, 76 tons; steel bands from Belgium, 64 tons; structural shapes from Belgium, 179 tons.

RAILROAD BUYING

Duluth, Missabe & Iron Range has placed an order for 25 ore cars with the Pullman-Standard Car Mfg. Co.

New York Central has ordered two lightweight coaches from Edward G. Budd Mfg. Co.

Northwestern Refrigerator Line has ordered 250 40-ton steel underframe refrigerator cars from American Car & Foundry Co.

Delaware, Lackawanna & Western inquiry for 500 hopper cars reported Nov. 11 in THE IRON AGE, has been cancelled.

New York Central and Pennsylvania have ordered more than 100 all-steel welded passenger cars from Pullman-Standard Car Mfg. Co.

RAILS AND TRACK SUPPLIES

Louisville & Nashville has placed 20,500 tons with Tennessee Coal Iron & Railroad Co.

Nashville, Chattanooga & St. Louis has ordered 4890 tons from Tennessee Coal, Iron & Railroad Co.

. . . NON-FERROUS . . .

. . . Copper demand dries up; price cut to 10.75c.

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. . . Zinc quotations reduced $5 per ton.

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. . . October lead deliveries drop 19,558 tons.

NEW YORK, Nov. 23.—Weak foreign markets and further declines in the ingot production rate erased all buying activity in the non-ferrous market and forced declines in quotations on copper, zinc and tin. The domestic copper smelter that has taken the initiative in past reductions lowered prices today to 10.75c. per lb., Connecticut Valley, for electrolytic metal. Sales for the week totaled 3416 tons, as compared with over 6000 tons in the previous week, and the total for the month to date is only 12,992 tons. Export prices moved progressively downward during the week and this morning stood at 9.71c. per lb., c.i.f., usual base ports, as compared with 10.27c. a week ago.

The Week's Prices. Cents Per Pound for Early Delivery

	Nov. 17	Nov. 18	Nov. 19	Nov. 20	Nov. 22	Nov. 23
Electrolytic copper, Conn.*	11.00	11.00	11.00	11.00	11.00	10.75
Lake copper, N. Y.	12.125	12.125	12.125	12.125	12.125	12.125
Straits tin, spot, New York	42.75	41.375	41.50	...	41.00	41.625
Zinc, East St. Louis	5.75	5.75	5.75	5.75	5.50	5.50
Zinc, New York	6.10	6.10	6.10	6.10	5.85	5.85
Lead, St. Louis	4.85	4.85	4.85	4.85	4.85	4.85
Lead, New York	5.00	5.00	5.00	5.00	5.00	5.00

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin, 99 per cent plus 20.00c.-21.00c. a lb. delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 15.75c. a lb., prompt, f.o.b., New York.
Antimony, American, 15.50c. per lb., prompt shipment, New York.
Quicksilver, $85.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 11.25c. a lb., less carload, delivered in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	42.50c. to 43.50c.
Tin, bar	44.50c. to 45.50c.
Copper, Lake	13.00c. to 14.00c.
Copper, electrolytic	13.00c. to 14.00c.
Copper, castings	12.75c. to 13.75c.
*Copper sheets, hot-rolled	20.125c.
*High brass sheets	18.125c.
*Seamless brass tubes	20.875c.
*Seamless copper tubes	20.875c.
*Brass rods	14.625c.
Zinc, slabs	7.00c. to 8.00c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	13.00c.
Lead, American pig	6.00c. to 7.00c.
Lead, bar	7.25c. to 8.25c.
Lead, sheets, cut	8.50c.
Antimony, Asiatic	18.00c. to 19.00c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	31.00c. to 33.00c.
Babbitt metal, commercial grade	20.00c. to 60.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 25 per cent allowed off for extras, except copper sheets and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	45.00c.
Tin, bar	47.00c.
Copper, Lake	13.00c. to 13.25c.
Copper, electrolytic	12.75c. to 13.00c.
Copper, castings	12.75c. to 13.25c.
Zinc, slabs	8.75c. to 9.00c.
Lead, American pig	5.50c. to 5.75c.
Lead, bar	9.00c.
Antimony, Asiatic	18.00c. to 18.50c.
Babbitt metal, medium grade	17.25c.
Babbitt metal, high grade	49.00c.
Solder, ½ and ½	25.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.625c.	8.375c.
Copper, hvy. and wire	7.00c.	7.50c.
Copper, light and bottoms	6.00c.	6.25c.
Brass, heavy	4.25c.	4.875c.
Brass, light	3.25c.	4.00c.
Hvy. machine composition	6.75c.	7.25c.
No. 1 yel. brass turnings	4.75c.	5.25c.
No. 1 red brass or compos. turnings	6.50c.	7.00c.
Lead, heavy	4.00c.	4.375c.
Cast aluminum	10.625c.	11.75c.
Sheet aluminum	12.00c.	13.50c.
Zinc	3.00c.	3.375c.

Zinc

Domestic prime Western quotations were lowered $5 per ton on Monday to a basis of 5.85c. per lb., New York, as a result of the continued lack of buying activity here and sagging prices in London. Sales of prime Western for the week declined to 390 tons, and deliveries amounted to 3304 tons. Undelivered contracts now stand at 61,591 tons. On first call in London today, spelter was quoted at 3.31c. per lb., or 0.30c. below last week's level, with sales running very light.

Lead

The market has been very quiet, with consumers continuing their hand-to-mouth buying practices. Current buying is mostly for November positions, with 50 per cent of the December requirements yet to be specified. Quotations remain unchanged at 5c. per lb., New York. Lead shipments in October showed a sharp drop, totaling 39,292 tons, as against 53,850 tons in September. Production in October advanced to 49,197 tons from 41,046 tons in the previous month, and stocks rose 9904 tons, currently standing at 100,646 tons.

Brass and Bronze Ingots

The average prices received by members of the Non-Ferrous Ingot Metal Institute during the 28-day period ended Oct. 29 on commercial 80-10-10 and 85 per cent brass were 14.732c. and 12.743c. per lb., respectively. These compare with 15.543c. and 13.249c. in the previous month. Unfilled orders on Nov. 1 totaled 15,557 tons, as against 18,641 tons on Oct. 1, and deliveries for the period amounted to 5430 tons, as compared with 6883 tons in the September period.

Tin

The erratic movements of the market have discouraged all forward covering and consumer interest at present is limited to immediate requirements. A small amount of buying was done during the past week as prices moved downward, with today's quotation of 41.625c. per lb., New York, being 1.375c. below the price position of a week ago. A moderate amount of business was transacted in London over the past week and quotations on cash standards declined from £187 15s. a week ago, to £181 on first call this morning.

IRON AND STEEL SCRAP

. . . Declines reported in most centers, but composite is unchanged despite softness at Pittsburgh and Chicago.

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. . . Buying for export makes Philadelphia highest market in country for No. 1 steel.

NOV. 23.—For the first time in many years, if not in history, No. 1 steel is commanding a higher price at Philadelphia than at Pittsburgh, largely as a result of the re-entry of the former district into export trade after an absence of many months. While no real test has been made on No. 1, a sale of No. 2 steel for domestic consumption shows the influence of foreign coverages. Prices have been adjusted upward at Philadelphia to account for this situation and the gain there is sufficient to offset declines of 50c. at Pittsburgh and Chicago, leaving the composite price unchanged at $12.92. No buying of any consequence is being done by any mills. At St. Louis some trading is being carried on among dealers, and yard dealers are laying down scrap at Youngstown, Cleveland, Cincinnati and Buffalo. The export market is picking up at Boston and prices are firmer. Barge congestion at New York is keeping export prices at an even level there and is preventing the accumulation of material for the recent 500,000-ton sale to the European cartel.

Pittsburgh

The market is slightly softer than a week ago, due largely to a further dip in steel ingot output. No buying of any consequence is being done by either dealers or consumers and embargoes on shipments remain in effect. Some brokers are able to pick up odd carloads at $13 and $12.50 a ton and recently negligible sales into consumption have been made at $13.50 a ton. Because of these factors and because some brokers express willingness to sell a tonnage at $13.50, No. 1 heavy melting steel is quotable this week at $13 to $13.50, off 50c. a ton. With no consumer buying, some brokers have purchased railroad heavy melting at slightly above and slightly below $14 a ton.

Chicago

Reflecting the continuation of poor mill operations, scrap prices declined 50c. to $2 a ton again this week, No. 1 steel now being quoted at $11.50 to $12. Practically nothing is moving, and dealer-broker sales are at a minimum. At present operating schedules, mills have enough old material on hand and on order to make unnecessary ordering anew for four to six months. Some railroad steel will be offered this week by the Burlington, Milwaukee and Rock Island roads.

Philadelphia

Ostensibly continuing to move downward on a price spiral last week as a reflection of a persistently weak undertone, the market here has since staged a mild rebound as the result of sustained buying for export. At least one dealer is now picking up moderate lots of No. 1 at $13.75 to $14, delivered Port Richmond, and No. 2 has gone for as high as $13.50. This continued covering on export orders in this district, which for many months has ignored the foreign market, has for the moment established this market higher than any other district in the country, and has forced broker bids up on those small lots still required to complete outstanding domestic commitments. Some stove plate is going to Harrisburg and to Phoenixville at $12, Alan Wood and Phoenixville have taken some No. 2 at $12, and as high as $14 has been offered at Coatesville for No. 1. The market is expected to stay very near present levels for at least several weeks.

Cleveland

Low prices are arousing no consumer interest in scrap and in the absence of any demand prices have again declined 50c. a ton on most grades in both Cleveland and Youngstown. However, quotations are nominal. Yard dealers are buying considerable scrap to lay down at around $10.50 to $11 for No. 1 heavy melting steel and $6 to $8 for blast furnace grades. A Youngstown broker is reported to be offering $12 for heavy melting steel to lay down.

Buffalo

Some buying by dealers has been done with the object of laying down material, but this is the only activity in an otherwise entirely stagnant market. Dealers have been encouraged by the prevalence of the export demand to believe that supplies may be scarce in the spring. Prices are nominal and the most optimistic sellers hesitate to predict any real activity before spring.

St. Louis

Scrap iron prices have been marked down from 50c. to as much as $2 a ton, as a result of some trading among dealers. There is no buying by the mills in the St. Louis district, although a large operator on the East Side is expected to come into the market for a heavy tonnage sometime in December, with shipments to start after the turn of the year. The purchaser of 10,000 to 15,000 tons reported last week has extended the time for deliveries under the contract to 90 days.

Cincinnati

The local old materials market is dull and featureless. Bids eased further the past week as dealers failed to receive any response from mills. Some material, purchased at low prices, is being laid down in yards, but dealers are wary of a long position.

Prices are unchanged. Sentiment still is strongly bearish in the Detroit scrap market. With the major producer operating only half its open-hearth furnaces since Saturday, the local market for scrap has faded away entirely. Only one list, that of Ternstedt, is out. It will close Nov. 30. Chrysler and General Motors lists which will make their appearance soon are a very uncertain factor because it is reported that operations in December in General Motors plants will be carried on only 12 days, at Chrysler only 15 days and Hudson at about 50 per cent of capacity.

New York

Prices on materials for domestic consumption remain purely nominal in the absence of any sales. A dealer was said to be buying some No. 2 steel for delivery to Phoenixville at $8.65 (delivered price $12), but this seems unlikely in view of the $12 offered price for the same grade on trucks delivered to barges for export. The recent 500,000-ton sale to the European cartel has had little effect upon the export market so far, as it will be some time before brokers begin to cover this order. Tonnages on old orders are accumulating demurrage charges on barges while awaiting ocean bottoms or docks to berth them or stevedores to load them. Buying prices for export are unchanged.

Boston

Two steamers are loading scrap here, presumably for Great Britain. In addition, it is expected 10 boats will leave this port within the next 60 days, and two from Providence. As a result of these charters the export market is perking up, although it has not as yet become active. Prices are firmer. So far as domestic business goes, the market is absolutely flat, and quotations purely nominal. Shipments of chemical borings have dropped to a minimum, and foundries the past week showed little or no interest in machinery and textile cast.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$13.00 to	$13.50
Railroad hvy. mltng. ..	....	14.00
No. 2 hvy. mltng. steel.	11.50 to	12.00
Scrap rails	....	14.00
Rails 3 ft. and under..	18.00 to	18.50
Comp. sheet steel	13.00 to	13.50
Hand bundled sheets..	12.00 to	12.50
Hvy. steel axle turn..	11.50 to	12.00
Machine shop turn.....	7.50 to	8.00
Short shov. turn.	7.50 to	8.00
Mixed bor. & turn.	7.50 to	8.00
Cast iron borings	7.50 to	8.00
Cast iron carwheels....	15.00 to	15.50
Hvy. breakable cast...	12.50 to	13.00
No. 1 cupola cast.....	16.00 to	16.50
RR. knuckles & cplrs.	17.00 to	17.50
Rail coil & leaf springs	17.00 to	17.50
Rolled steel wheels....	17.00 to	17.50
Low phos. billet crops.	17.50 to	18.00
Low phos. sh. bar.....	17.00 to	17.50
Low phos. punchings..	16.00 to	16.50
Low phos. plate. hvy..	17.00 to	17.50
Low phos. plate clips..	14.50 to	15.00
Steel car axles	17.50 to	18.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$13.50 to	$14.00
No. 2 hvy. mltng. steel	12.00 to	12.50
Hydraulic bund., new..	13.50 to	14.00
Hydraulic bund., old...	9.50 to	10.00
Steel rails for rolling..	17.00 to	17.50
Cast iron carwheels...	16.00 to	16.50
Hvy. breakable cast...	14.00 to	14.50
No. 1 cast	16.00 to	16.50
Stove plate (steel wks.)	12.00 to	12.50
Railroad malleable	16.00 to	16.50
Machine shop turn.....	9.00 to	9.50
No. 1 blast furnace ...	8.00 to	8.50
Cast borings	8.50 to	9.00
Heavy axle turnings...	11.00 to	11.50
No. 1 low phos. hvy...	18.00 to	18.50
Couplers & knuckles..	18.00 to	18.50
Rolled steel wheels....	18.00 to	18.50
Steel axles	20.00 to	20.50
Shafting	19.50 to	20.00
No. 1 RR. wrought	16.00 to	16.50
Spec. iron & steel pipe	13.00 to	13.50
No. 1 forge fire	12.50 to	13.00
Cast borings (chem.)..	13.50 to	14.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel	$11.50 to	$12.00
Auto. hvy. mltng. steel alloy free	10.00 to	10.50
No. 2 auto. steel	9.50 to	10.00
Shoveling steel	11.50 to	12.00
Hydraul. comp. sheets.	11.00 to	11.50
Drop forge flashings...	9.00 to	9.50
No. 1 busheling	10.50 to	11.00
Rolled carwheels	15.00 to	15.50
Railroad tires, cut.....	15.25 to	15.75
Railroad leaf springs..	16.00 to	16.50
Steel coup. & knuckles	15.00 to	15.50
Axle turnings	11.00 to	11.50
Coil springs	16.50 to	17.00
Axle turn (elec.)	12.00 to	12.50
Low phos. punchings..	15.00 to	15.50
Low phos. plates, 12 in. and under	14.50 to	15.00
Cast iron borings	7.00 to	7.50
Short shov. turnings...	7.50 to	8.00
Machine shop turn. ...	6.00 to	6.50
Rerolling rails	14.25 to	14.75
Steel rails under 3 ft...	15.00 to	15.50
Steel rails under 2 ft...	15.50 to	16.00
Angle bars, steel	14.75 to	15.25
Cast iron carwheels ..	14.25 to	14.75
Railroad malleable	13.75 to	14.25
Agric. malleable	11.25 to	11.75
	Per Net Ton	
Iron car axles	18.50 to	19.00
Steel car axles	16.50 to	17.00
No. 1 RR. wrought	9.50 to	10.00
No. 2 RR. wrought ...	10.25 to	10.75
No. 2 busheling, old ...	4.75 to	5.25
Locomotive tires	14.75 to	15.25
Pipes and flues	8.75 to	9.25
No. 1 machinery cast..	11.25 to	11.75
Clean auto. cast.	11.00 to	11.50
No. 1 railroad cast. ...	10.25 to	10.75
No. 1 agric. cast.....	10.25 to	10.75
Stove plate	8.00 to	8.50
Grate bars	8.00 to	8.50
Brake shoes	7.50 to	8.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$13.00 to	$13.50
Hydraulic bundles	12.50 to	13.00
Machine shop turn. ...	10.00 to	10.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$12.50 to	$13.00
No. 2 hvy. mltng. steel.	11.50 to	12.00
Comp. sheet steel	12.00 to	12.50
Light bund. stampings.	9.00 to	9.50
Drop forge flashings...	11.50 to	12.00
Machine shop turn. ...	7.50 to	8.00
Short shov. turn.	9.50 to	10.00
No. 1 busheling	11.50 to	12.00
Steel axle turnings ...	10.00 to	10.50
Low phos. billet and bloom crops	18.50 to	19.50
Cast iron borings	9.00 to	9.50
Mixed bor. & turn. ...	9.00 to	9.50
No. 2 busheling	8.50 to	9.00
No. 1 cast	17.00 to	17.50
Railroad grate bars...	8.50 to	9.00
Stove plate	8.00 to	8.50
Rails under 3 ft.	18.00 to	18.50
Rails for rolling	17.00 to	17.50
Railroad malleab'e	16.00 to	16.50
Cast iron carwheels...	15.50 to	16.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel.	$13.00 to	$13.50
No. 2 hvy. mltng. steel.	12.00 to	12.50
Scrap rails	14.00 to	14.50
New hvy. b'ndled sheet	12.00 to	12.50
Old hydraul. bundles..	11.00 to	11.50
Drop forge flashings ..	12.00 to	12.50
No. 1 busheling	12.00 to	12.50
Hvy. axle turnings ...	12.00 to	12.50
Machine shop turn....	7.00 to	7.50
Knuckles & couplers..	16.50 to	17.00
Coil & leaf springs....	16.50 to	17.00
Rolled steel wheels....	16.50 to	17.00
Low phos. billet crops.	17.50 to	18.00
Shov. turnings	10.00 to	10.50
Mixed bor. & turn.	8.50 to	9.00
Cast iron borings	8.50 to	9.00
Steel car axles	16.50 to	17.00
No. 1 machinery cast..	15.00 to	15.50
No. 1 cupola cast.	14.00 to	14.50
Stove plate	12.00 to	12.50
Steel rails under 3 ft...	17.00 to	17.50
Cast iron carwheels ..	15.00 to	15.50
Railroad malleable	15.00 to	15.50
Chemical borings	10.50 to	11.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$13.00 to	$13.50
No. 1 hvy. melting....	13.00 to	13.50
No. 2 hvy. melting.....	12.00 to	12.50
No. 1 locomotive tires.	16.00 to	16.50
Misc. stand.-sec. rails.	13.50 to	14.00
Railroad springs	15.00 to	15.50
Bundled sheets	8.00 to	8.50
No. 1 busheling	7.00 to	7.50
Cast bor. & turn.	6.00 to	6.50
Rails for rolling	14.00 to	14.50
Machine shop turn. ...	6.00 to	6.50
Heavy turnings	8.50 to	9.00
Steel car axles	19.50 to	20.00
Iron car axles	21.50 to	22.00
No. 1 RR. wrought	8.00 to	8.50
No. 2 RR. wrought	13.00 to	13.50
Steel rails under 3 ft...	16.00 to	16.50
Steel angle bars	15.00 to	15.50
Cast iron carwheels...	16.50 to	17.00
No. 1 machinery cast...	12.75 to	13.25
Railroad malleable	15.00 to	15.50
No. 1 railroad cast.....	13.25 to	13.75
Stove plate	9.00 to	9.50
Agricul. malleable	10.00 to	10.50
Grate bars	11.25 to	11.75
Brake shoes	10.00 to	10.50

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$10.00 to	$10.50
No. 2 hvy. mltng. steel	8.00 to	8.50
Scrap rails for mltng...	15.00 to	15.50
Loose sheet clippings..	6.50 to	7.00
Hydrau. b'ndled sheets	10.00 to	10.50
Cast iron borings	4.50 to	5.00
Machine shop turn.	6.00 to	6.50
No. 1 busheling	8.50 to	9.00
No. 2 busheling	3.50 to	4.00
Rails for rolling	17.00 to	17.50
No. 1 locomotive tires.	13.50 to	14.00
Short rails	17.50 to	18.00
Cast iron carwhee's...	12.00 to	12.50
No. 1 machinery cast..	11.00 to	11.50
No. 1 railroad cast.....	9.50 to	10.00
Burnt cast	6.00 to	6.50
Stove plate	6.00 to	6.50
Agricult. malleable ...	11.00 to	11.50
Railroad malleable	13.00 to	13.50
Mixed hvy. cast.	8.00 to	8.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	$16.00 to	$16.50
Scrap steel rails	....	17.00
Short shov. turnings..	....	8.50
Stove plate	....	10.50
Steel axles	18.00 to	19.00
Iron axles	15.50 to	18.00
No. 1 RR. wrought....	13.00 to	15.00
Rails for rolling	18.00 to	20.00
No. 1 cast	16.00 to	18.00
Tramcar wheels	16.00 to	18.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$9.00 to	$9.50
No. 2 hvy. mltng. steel.	8.00 to	8.50
Borings and turnings..	5.50 to	6.00
Long turnings	5.00 to	5.50
Short shov. turnings..	6.00 to	6.50
No. 1 machinery cast..	11.75 to	12.25
Automotive cast.	12.75 to	13.25
Hvy. breakable cast...	10.25 to	10.75
Hydraul. comp. sheets.	9.50 to	10.00
Stove plate	7.50 to	8.00
New factory bushel....	9.00 to	9.50
Old No. 2 busheling ..	5.00 to	5.50
No. 2 busheling (black fender stock)		Nominal
Sheet clippings	6.50 to	7.00
Flashings	8.50 to	9.00
Low phos. plate scrap.	10.50 to	11.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$10.00 to	$10.50
No. 2 hvy. mltng. steel.	8.50 to	9.00
Hvy. breakable cast ...	10.50 to	11.00
No. 1 machinery cast...	11.50 to	12.00
No. 2 cast	9.50 to	10.00
Stove plate	7.50 to	8.00
Steel car axles	19.00 to	19.50
Shafting	16.00 to	16.50
No. 1 RR. wrought	11.00 to	11.50
No. 1 wrought long...	10.00 to	10.50
Spec. iron & steel pipe	9.00 to	9.50
Rails for rolling.....	16.00 to	16.50
Clean steel turnings ..	5.00 to	5.50
Cast borings	5.00 to	5.50
No. 1 blast furnace....	5.00 to	5.50
Cast borings (chem.)..	10.00 to	10.50
Unprepar. yard scrap..	5.50 to	6.00

Per gross ton, delivered local foundries:

No. 1 machn. cast.....	$15.50 to	$16.00
No. 2 cast.	11.00 to	11.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$13.30 to	$13.80
Scrap rails	13.30 to	13.80
No. 2 steel	12.30 to	12.80
Breakable cast.	12.50 to	13.00
Machine shop turn.....	....	6.20
Mixed bor. & turn.....	....	4.60
Bund. skeleton long....	....	7.95
Shafting	17.50 to	18.00
Cast bor. chemical	8.00 to	8.50

Per gross ton delivered consumers' yards:

Textile cast.	$15.50 to	$16.00
No. 1 machine cast.	15.50 to	16.00

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$10.50 to	$11.00
No. 2 hvy. mltng. steel.	9.50 to	10.00

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. stl..	$14.50	$14.00
No. 2 hvy. mltng. stl..	13.50	13.00
Mixed dealers steel...	12.50	12.00
Scrap pipe	11.75	11.50
Steel turnings	9.75	9.50
Cast borings	11.00	10.50
Machinery cast.	18.00	17.00
Dealers cast.	16.00	15.00
Stove plate	13.00	11.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges.		
No. 1 hvy. mltng. steel.	$13.00 to	$13.50
No. 2 hvy. mltng. steel.	$11.50 to	$12.00
No. 2 cast.	....	11.00
Stove plate	8.50 to	9.00
Boston on cars at Army Base or Mystic Wharf		
No. 1 hvy. mltng. steel.	....	$14.00
No. 2 hvy. mltng. steel.	....	13.00
Rails (scrap)	....	14.00
Philadelphia, delivered alongside boats, Port Richmond		
No. 1 hvy. mltng. steel.	$14.00 to	$14.50
No. 2 hvy. mltng. steel.	13.00 to	13.50

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

F.o.b Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	48.00
F.o.b. Worcester, Mass.	49.00
F.o.b. Birmingham	50.00
F.o.b. San Francisco	56.00
F.o.b. Galveston	53.00

Rods over 9/32 in. to 47/64 in., inclusive, $5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.45c.
F.o.b. Chicago or Gary	2.50c.
F.o.b. Duluth	2.60c.
Del'd Detroit	2.60c.
F.o.b. Cleveland	2.50c.
F.o.b. Buffalo	2.55c.
Del'd Philadelphia	2.74c.
Del'd New York	2.79c.
F.o.b. Birmingham	2.60c.
F.o.b cars dock Gulf ports	2.85c.
F.o.b. cars Pacific Ports	3.00c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
F.o.b. Buffalo	2.40c.
F.o.b. Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.85c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.55c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.60c.
Del'd Detroit	2.70c.
F.o.b. cars dock Gulf ports	2.95c.
F.o.b. cars dock Pacific ports	2.95c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.40c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.80c.
F.o.b. cars dock Pacific ports	2.80c.

Iron

F.o.b. Chicago	2.40c.
F.o.b. Pittsburgh (refined)	3.60c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.90c.
F.o.b. Cleveland, Chicago and Gary	2.95c.
F.o.b. Buffalo	3.00c.
F.o.b. Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Gary	2.30c.
Del'd Cleveland	2.445c.
F.o.b Coatesville or Spar. Pt.	2.35c.
Del'd Philadelphia	2.435c.
Del'd New York	2.54c.
F.o.b. Birmingham	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.
Wrought iron plates, f.o.b. Pittsburgh	3.80c.

Floor Plates

F.o.b. Pittsburgh	3.50c.
F.o.b. Chicago	3.55c.
F.o.b. Coatesville	3.60c.
F.o.b. cars dock Gulf ports	3.90c.
F.o.b. cars dock Pacific ports	4.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago	2.30c.
Del'd Cleveland	2.445c.
F.o.b. Buffalo or Bethlehem	2.35c.
Del'd Philadelphia	2.455c.
Del'd New York	2.5125c.
F.o.b. Birmingham (standard)	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Chicago or Buffalo	2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports	3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb.	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.40c.
No. 10, f.o.b. Gary	2.50c.
No. 10, del'd Detroit	2.60c.
No. 10, del'd Philadelphia	2.69c.
No. 10, f.o.b. Granite City	2.60c.
No. 10, f.o.b. Birmingham	2.55c.
No. 10, f.o.b. cars dock Pacific ports	2.95c.
No. 10 wrought iron, Pgh.	4.25c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	3.15c.
No. 24, f.o.b. Gary	3.25c.
No. 24, del'd Detroit	3.35c.
No. 24, del'd Philadelphia	3.44c.
No. 24, f.o.b. Granite City	3.35c.
No. 24, f.o.b. Birmingham	3.30c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	5.15c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	3.10c.
No. 10 gage, f.o.b. Gary	3.20c.
No. 10 gage, f.o.b. Detroit	3.30c.
No. 10 gage, del'd Philadelphia	3.39c.
No. 10, f.o.b. Granite City	3.30c.
No. 10 gage, f.o.b. Birmingham	3.25c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.55c.
No. 20 gage, f.o.b. Gary	3.65c.
No. 20 gage, del'd Detroit	3.75c.
No. 20 gage, del'd Philadelphia	3.84c.
No. 20, f.o.b. Granite City	3.75c.
No. 20 gage, f.o.b. Birmingham	3.70c.
No. 20 gage, f.o.b. cars, dock, Pacific ports	4.10c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.80c.
No. 24, f.o.b. Gary	3.90c.
No. 24, del'd Philadelphia	4.09c.
No. 24, f.o.b. Granite City	4.00c.
No. 24, f.o.b. Birmingham	3.95c.
No. 24, f.o.b. cars, dock, Pacific ports	4.40c.
No. 24, wrought iron, Pittsburgh	6.10c.

Electrical Sheets

(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot rolled, annealed sheets with few exceptions.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars, dock, Pacific ports	4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.50c.
No. 20, f.o.b. Gary	3.60c.
No. 20, f.o.b. Granite City	3.70c.
No. 20, f.o.b. cars dock Pacific ports	4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.	3.30c.
No. 28, Gary	3.40c.
No. 28, f.o.b. Granite City	3.50c.
No. 28, cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.35
Standard cokes, f.o.b. Gary	5.45
Standard coke, f.o.b. Granite City	5.55

Special Coated Manufacturing Ternes

	Base per Box
F.o.b. Pittsburgh	$4.65
F.o.b. Gary	4.75
F.o.b. Granite City	4.85

Roofing Terne Plate

(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Hot-Holled Hoops, Bands, Strip and Flats under ¼ In.

	Base per Lb
All widths up to 24 in., Pittsburgh	2.40c
All widths up to 24 in., Chicago	2.50c.
All widths up to 24 in., del'd Detroit	2.60c.
All widths up to 24 in., Granite City	2.60c.
All widths up to 24 in., Birmingham	2.55c.
Cooperage stock, Pittsburgh	2.50c.
Cooperage stock, Chicago	2.60c.

Cold-Rolled Strip*

	Base per Lb
F.o.b. Pittsburgh	3.20c.
F.o.b. Cleveland	3.20c.
Del'd Chicago	3.48c.
F.o.b. Worcester	3.40c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon	Over 1.00	8.50c.	8.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.45c.
No. 20, Pittsb'gh or Cleveland	3.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smoth coated nails	$2.75
Cut nails, carloads	$3.60

	Base per 100 Lb.
Annealed fence wire	$3.15
Galvanized fence wire	3.55
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column	74
Single loop bale ties, base col.	63

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	52	31	¼ & ⅜	.+13	+35
¼ to ⅜	..55	38½	½	20	1½
½	....59½	49	¾	26	8
¾	....62½	53	1 & 1¼	.30	14
1 to 3	..64½	55½	1½	34	16½
			2	....33½	16

Lap Weld

2	57	47½	2	....26½	10
2½ & 3	..60	50½	2½ to 3½	27½	12½
3½ to 6	..62	52½	4	....29½	16
7 & 8	..61	50½	4½ to 8	..28½	15
9 & 10	..60½	50	9 to 12	..24½	10
11 & 12	..59½	49			

Butt Weld, extra strong, plain ends

⅛	....50½	36½	¼ & ⅜	.+14	+48
¼ to ⅜	..52½	40½	½	21	4
½	....57½	48½	¾	27	10
¾	....61½	52½	1 to 2	..34	17½
1 to 3	63	55			

Lap Weld, extra strong, plain ends

2	55	46½	2	....29½	13½
2½ & 3	..59	50½	2½ to 4	..35	20½
3½ to 6	..62½	54	4½ to 6	..33½	19
7 & 8	..61½	51	7 & 8	..34½	19½
9 & 10	..60½	50	9 to 12	..28	15½
11 & 12	..59½	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 8.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. o.d.	13 B.W.G.	12.38	11.00
1¾ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2¼ in. o.d.	12 B.W.G.	19.37	17.21
2½ in. o.d.	12 B.W.G.	21.22	18.85
2¾ in. od.	12 B.W.G.	22.49	19.98
3 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

40,000	lb.	or	ft.	or	over	Base
30,000	lb.	or	ft.	to	39.999 lb. or ft.	5%
20,000	lb.	or	ft.	to	29.999 lb. or ft.	10%
10,000	lb.	or	ft.	to	19.999 lb. or ft.	20%
5,000	lb.	or	ft.	to	9,999 lb. or ft.	30%
2,000	lb.	or	ft.	to	4,999 lb. or ft.	45%
Under 2,000 lb. or ft						65%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	56.00
F.o.b. dock, Seattle	56.00
4-in. f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	59.00

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago; and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. x 6 in. and smaller	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10*
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
½ in. and smaller	65
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:	
½ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60
Stove bolts in packages, nuts attached	70
Stove bolts in packages, with nuts separate	70 and 10
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	$3.60
F.o.b. Chicago or Birmingham	3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more.)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	3.00c.
Delivered, Detroit	3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
200 (½% Nickel)	$0.35
2100 (1½% Nickel)	0.75
2300 (3½% Nickel)	1.55
2500 (5% nickel)	$2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finishd Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	80c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	22s. 9d. to 23s. 3d.
Steel bars, open-hearth	£11
Beams, open-hearth	£11 2s. 6d.
Channels, open-hearth	£11 7s. 6d.
Angles, open-hearth	£11 2s. 6d.
Black sheets, No. 24 gage	£15
Galvanized sheets, No. 24 gage	£18 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	£5 7s. 6d.
Wire rods, No. 5 B.W.G.	£6 10s.
Steel bars, merchant	£6
Sheet bars	£5 8s. 6d.
Plate ¼ in. and up	£7 7s.
Plate 3/16 in. and 5 mm.	£7 13s.
Sheet, ¼ in.	£8 9s. 6d.
Beams, Thomas	£5 8s.
Angles (Basic)	£6 2s. 6d
Hoops and strip, base	£6 10s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Per Net Ton
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No. 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bundles	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large .....1 to 24 kegs	$3.75
	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bolts, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	3.45c.
Wire, galv. soft, base per 100 lb.	3.85c.
Common wire nails, per keg	3.00c.
Cement coated nails, per keg	3.00c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO *Base per Lb.*

Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	$4.40
Track bolts (keg lots)	5.05
Rivets, structural (keg lots)	**4.95
Rivets, boiler (keg lots)	**5.05
	Per Cent Off List
Machine bolts and carriage bolts, ½ in. and smaller	60
Lag screws	*55 and 5
Hot-pressed nuts, sq. and hex., tap or blank, ½ by 6 in. and smaller	60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

** Base at 100 lb.

NEW YORK *Base per Lb.*

Plates, ¼ in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.25 to 7.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled: strip, soft and quarter hard	3.92c
Hoops	4.32c.
Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.82c.
Galvanized sheets (No. 24*)	4.50 to 5.47c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.60c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.40c.
Deep drawing	6.05c.
Stretcher leveled	6.05c.
SAE, 2300, hot-rolled	7.82c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.35c.
Floor plate, ⅛ in. and heavier	5.60c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.25c.
Wire, galv. (No. 9)	4.60c.
Tire steel, 1 x ½ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.
	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.84c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	5.29c.
Boiler rivets	5.39c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	50
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	60

* No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.90c.
*Structural shapes	3.90c.
*Soft steel bars, small shapes, iron bars (except bands)	4.00c.
‡Reinforc. steel bars, sq. twisted and deformed	3.53c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	4.10c.
*Spring steel	5.50c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	4.00c.
*Diam. pat. floor plates, ¼ in.	5.25c.

These prices are for delivery in Philadelphia trucking area.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.86c.
Soft steel bars	3.75c.
†Reinforc. steel bars	2.60c.
‡Cold-finished steel bars	4.30c
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95
	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count ½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

† Outside delivery 10c. less.

* For 5000 lb. or less.

‡ Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75c.
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg: Any quantity less than carload	3.20
Cement c't'd nails, base 100-lb. keg	3.50
Chain, lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes, 2-in.	20.73
4-in.	48.41

BUFFALO *Base per Lb.*

Plates	3.92c.
Floor plates	5.52c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.80c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.45c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON *Base per Lb.*

Channels, angles	4.20c.
Tees and zees, under 3"	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.08c.
Floor plates, diamond pattern	5.13c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.49c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.85c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)*	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

*Under 400 lb., .50c. over base, 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c; 3500 lb. and over, base less 15c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes..	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles...	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5.81c.
Black annealed wire (No. 6 to No. 9 incl.)	4.05c.
Com. wire nails and cement coated nails 1 to 14 kegs	3.25c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60-5
1⅛ in. and larger	60
Coach and lag screws	60-5
Hot-pressed nuts, sq. and hex. tapped or blank, 1-199 lb.	50
200 lb. and over:	
½ in. and smaller	62½
9/16 to 1 in.	60
1⅛ in. and over	50

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.85c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BIRMINGHAM

Bars and bar shapes	$3.85 base	
Structural shapes and plates	3.75	"
Hot rolled sheets No. 10 ga.	3.80	"
Hot rolled sheets No. 24 ga.	4.40	" 3500 lb. and over
Galvanized sheets No. 24 ga.	5.05	" 3500 lb. or more
Strip	4.05	"
Reinforcing bars	3.85	"
Floor plates	5.96	"
Cold finished bars	4.91	"
Machine and carriage bolts	50 & 10 off list	
Rivets (structural)	$4.60 base	

On plates, shapes, bars, hot rolled strip, heavy hot rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons.	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.50c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb. All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Reinforcing shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.76c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	$3.55
Bolts and nuts, per cent off list	60

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
	Base per Lb.		
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	3.625c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.85c.	5.55c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.70c.	5.90c.
Cold-finished steel Rounds	6.80c.	6.85c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	$3.40	$3.40	$3.40

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	62.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	43.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F. o.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.47
Delivered Newark or Jersey City	26.53
Delivered Philadelphia	25.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
F.o.b. Jackson, Ohio	25.75
Delivered Cincinnati	24.27
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass.	$25.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.61
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44
F.o.b. Jackson, Ohio	25.50
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.53
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago..	24.50
F.o.b. Birmingham	25.00
Delivered Cincinnati	25.61
Delivered Canton, Ohio	25.89
Delivered Mansfield, Ohio	26.44

Low Phosphorus

Basing points: Birdsboro, Pa. Steelton, Pa., and Standish, N. Y.	$28.50

Gray Forge

Valley or Pittsburgh furnace	$23.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.24

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 22.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$102.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$33.50
10.51 to 11.00%	34.00
11.01 to 11.50%	34.50
11.51 to 12.00%	35.00
12.01 to 12.50%	35.50
12.51 to 13.00%	36.00
13.01 to 13.50%	36.50
13.51 to 14.00%	37.00
14.01 to 14.50%	37.50
14.51 to 15.00%	38.00
15.01 to 15.50%	38.50
15.51 to 16.00%	39.00
16.01 to 16.50%	39.50
16.51 to 17.00%	40.00

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$1.80
Ferrotungsten, lots of 5000 lbs., nominally	1.85
Ferrotungsten, smaller lots, nominally	1.90
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.50c.*
Ferrochromium, 2% carbon	16.50c to 17.00c.*
Ferrochromium, 1% carbon	17.50c. to 18.00c.*
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.*
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.*
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50*
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	63.50
Ferrophosphorus, electric, 24% in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	80.00
Ferromolybdenum, per lb. Mo del	95c.
Calcium molybdate, per lb. Mo del	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$45.00
Ton lots or less, per ton	50.00
Silico-manganese, gross ton, delivered.	
3%	101.50
2.50% carbon grade	106.50
2% carbon grade	111.50
1% carbon grade	121.50

* Spot prices are $5 a ton higher. Spot premium on 75 per cent ferrosilicon is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Mesabi, non-Bessemer, 51.50%	$4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal	17.00c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	Nominal
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	50c.
Man., African, Indian, 44-48%	Nominal
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominal

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered	$23.50
Tungsten, domestic, scheelite delivered	$23.50 to $25.50
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)	$16.00
Rhodesian, 45%	22.00
Rhodesian, 48%	25.50
Turkish, 48-49%	25.00 to $26.00
Turkish, 45-46%	23.00 to 23.50
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:	
50%	$25.50 to $26.50
48-49%	24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$20.00
Domestic, barge and rail	21.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	22.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	5.25c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.875c.
Del'd Cleve'd, No. 4 industrial	5.75c.
Del'd Cleve'd, No. 5 industrial	4.75c.

COKE AND COAL

Coke	*Per Net Ton*
Furnace, f.o.b. Connellsville, Prompt	$4.25 to $4.50
Foundry, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.85 to 11.30
Foundry, by-product, Philadelphia	10.60
Foundry, by-product, delivered Cleveland	11.05
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

Coal	*Per Net Ton*
Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

FOR *High Quality Steels*

NIAGARA
BRAND
FERRO-ALLOYS

PITTSBURGH METALLURGICAL CO., Inc.

NIAGARA FALLS, N. Y.

SALES OFFICES: NEW YORK—30 Church St. • PITTSBURGH—Oliver Bldg. • CLEVELAND—Hanna Bldg.

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . Moderate improvement in demand noted in Cincinnati.

o o o

. . . Orders are off in most other centers, but outlook is bright for the first quarter.

o o o

. . . Foreign sales continue to be a sustaining factor; large Japanese inquiry out for lathes.

Cincinnati

MODERATE improvement in small machine tool demand was noted in this area the past week. Lathes, millers and grinders were in slightly greater demand than during the preceding week, while sales of other tools remained at about the same level. Brisker foreign purchasing is noted. Although quantities were not disclosed, several multiple-unit orders were among the week's business, while the remainder of bookings were for individual tools. Drilling machinery is in a quiet market, although builders report a few orders weekly.

Market feeling tends bright as manufacturers feel current business lull is temporary. This is largely because of the steady brisk inquiry for all types of machines. Production is steadily near the 60 per cent mark since backlogs are still sufficient to hold present operations at least for the remainder of the year.

Chicago

SINCE production has been at near capacity all year, and fairly substantial backlogs are still on hand with some business being received all the time, machinery sellers are presenting the most optimistic outlook of any of those in the metalworking industry in this district. Unfilled orders and estimates as to the business that will come in over the next few months are sufficient to convince the trade that it is, generally speaking, in a rather comfortable position. Current sales, of course, are off as much as a third in some instances, but the feeling of pessimism so prevalent among those in steel and other heavy industries has not yet spread to the machine tool interests here, nor does it give promise of so doing. It is commonly said in this vicinity that the business recession now being experienced is more artificial than real, and that much of the downturn has been caused by temporary reductions in operations by concerns that have orders on hand to run more fully but are holding back because of the uncertainty of the political and legislative situation. The taxes on undistributed profits and capital stock are the chief stumbling blocks in the way of further machine tool buying.

Detroit

CURRENT indications are that Ford Motor Co. is quietly in the market for presses to be installed in the new stamping plant for which contracts were recently awarded. About 50 100-ton presses are known to be under consideration. In anticipation of heavy schedules for next year, machine tool builders and tool and die plants are beginning to feel happier in the expectation that the first of the year will see them busy again. Budd has already stated that it will have a very heavy program to be launched in four or five weeks. The Michigan Alkali Co. at Wyandotte is ready to put up a $1,000,000 plant for the manufacture of caustic soda and chlorine by a new process using mercury cells. New power generating equipment will be required for this plant. The Nash-Kelvinator Corp. is moving four of its important departments to the Kelvinator building on Plymouth Road. Of greatest interest, perhaps, is the fact that the head of the purchasing department will have his offices and staff there.

Cleveland

THERE are no signs of any revival in machine tool sales, and the trade is not hopeful of any improvement during the remainder of the year. Dealers report that their business this month is less than in October. Deliveries have improved to the extent that some manufacturers are able to make prompt shipment of some models so that buyers do not have the incentive to anticipate their requirements that they had a few months ago.

There is considerable foreign inquiry from Russia and some from England. Russia is expected to buy considerable more equipment to inaugurate its third five-year plan starting Jan. 1. Japan is having trouble in providing funds for machine tools and carrying on a war at the same time. Because of this, shipments of a large amount of American machinery are being held up, sellers being unable to secure releases.

New York

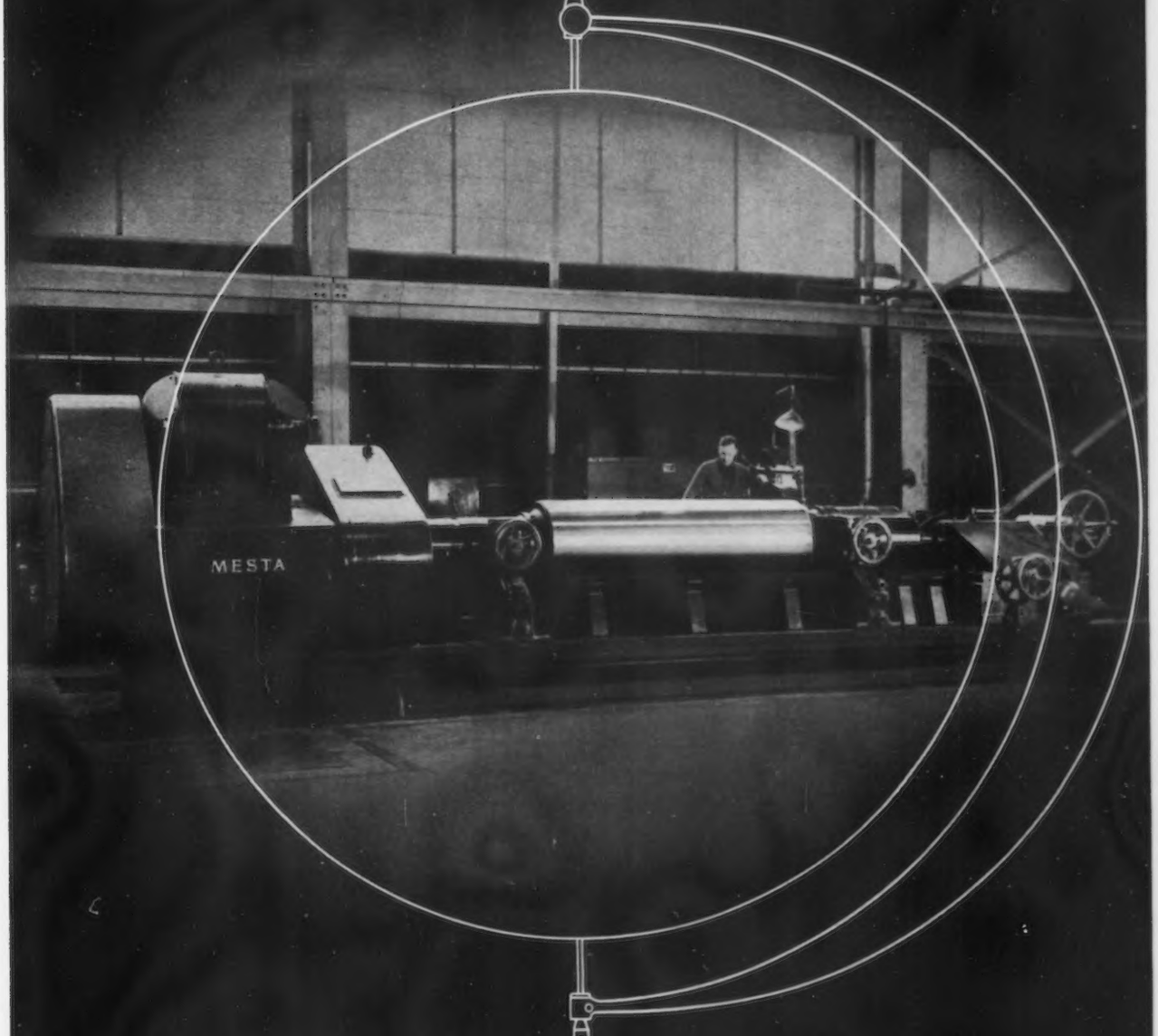
MACHINE tool orders have not declined nearly as much as the apparent decline in industrial activity would seem to indicate, but the sources are very limited, and this gives a very spotty appearance to the market. A sewing machine manufacturer, for example, since the first of the month is estimated to have spent close to $200,000 for new machinery, including approximately 20 milling machines, some engine lathes and turret lathes. Some of those dealers and factory representatives sharing in this business have approached their quota for the month from these sales alone. Up Boston way, it has been the United Shoe Machinery Co. that has held the spotlight in buying. American Locomotive Co. has bought a few machines in recent weeks and has plans for ultimately enlarging and modernizing its rod department, but no formal inquiries have been issued. Other prospects include a rather comprehensive machine shop for a destroyer tender of the U. S. Navy. Machinery bids are being obtained on a sub-contract basis. Other inquiry continues in fair volume, and most sellers have not slackened their paper work. As much of this equipment will appear on 1938 budgets, however, the sales outlook for December is not too encouraging, but the trade is far from pessimistic.

Export demand is holding to high levels. Japanese interests are said to be inquiring for 400 to 500 engine lathes for delivery by the end of January. An order for 46 of them was placed with one Cincinnati builder last week.

Pittsburgh

MACHINE tool orders during the past week were no better than a week ago and the volume so far this month is below that placed during the corresponding October period. Local offices are quite busy on inquiries for estimating and budget purposes. Regular inquiries are about as numerous as they have been for the past several weeks. Most dealers look for better activity next month with further improvement after the first of the year. Deliveries on various machine tools are easier with manufacturers making good headway on backlogs.

Precision GRINDING



MESTA ROLL GRINDERS

MESTA MACHINE COMPANY · PITTSBURGH

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Ethyl Gasoline Corp., 135 East Forty-second Street, New York, plans new plant at Baton Rouge, La., adjoining present Ethyl fluid works, for production of chemicals used in high-test gasoline. Project will include power house, machine shop and other mechanical units, steel tank storage and other facilities. Cost over $4,000,000 with machinery.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Dec. 10 for 58,500 ft. of cable and 59 reels (Circular 71).

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until Nov. 30 for 100 to 150 motor-driven electric marine flasher mechanisms with dual contact drive (Circular 55254).

American Enka Corp., 271 Church Street, New York, manufacturer of cellulose rayon products, has asked bids on general contract for addition to mill at Enka, near Asheville, N. C. Plans are under way also for other plant extensions. Entire project is scheduled for completion early next spring. Cost close to $500,000 with equipment.

Jacob Ruppert, 1639 Third Avenue, New York, operating Ruppert Brewery, has let general contract to H. M. Hughes Co., Inc., 30 East Forty-second Street, for extensions and improvements in brewery on East Ninety-third Street. Cost close to $70,000. Burns & Roe, Inc., 233 Broadway, is consulting engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 30 for steel tubing (Schedule 2182), and lamp typefuse indicators (Schedule 2127) for Brooklyn Navy Yard.

Joseph E. Seagram & Sons, Inc., 405 Lexington Avenue, New York, has approved plans for extensions and improvements in liquor distillery at Lawrenceburg, Ind., including new units for still house, feed grinding mill and other divisions. Cost over $1,500,000 with equipment.

Quartermaster General, State House, Trenton, N. J., asks bids until Nov. 30 for steel storage bins for Newark Infantry and Camden Field Artillery.

Solfo Paint & Chemical Co., 821 Pennington Avenue, Trenton, N. J., has acquired 3-acre tract at Sixth Street and Olden Avenue Extension, for new one-story plant, for which plans will be drawn soon. Cost over $50,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until Nov. 29 for one bed type milling machine (Circular 356), 10 gages (thread ring, adjustable snap, etc.), (Circular 360); until Nov. 30, 46,000 screws (Circular 361); until Dec. 1, one motor-driven drilling machine (Circular 373); until Dec. 13, 50,000 100-lb. empty practice bombs (Circular 371).

National Roofing Mfg. Co., York, Pa., plans rebuilding part of plant at Cly, near York, recently destroyed by fire. Loss close to $150,000 with equipment.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Nov. 29 for 150 bilge pumps and 16 hand pumps (Aero Req. 835), flexible aluminum alloy conduit, shielded (Aero Req. 837); until Nov. 30, precision ball bearings (Aero Req. 825), corrosion-resisting steel tie rods (Req. S. & A. 6160), 260 streamline tie rods (Req. S. & A. 6222), one universal engine stand and three mounting plates (Aero Req. 10½).

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Nov. 30 for one low-temperature annealing furnace for cartridge cases (Circular 475), reworking 170,000 lb. of brass scrap into 170,000 lb. of clip body brass (Circular 469), gages, thread plug, thread ring, plug check, etc. (Circular 471); until Dec. 1, 36,500 steel set screws (Circular 481), one set of 48 bench miller collets, 1/64 to ¾-in. (Circular 480).

Schramm, Inc., manufacturer of air compressors, West Chester, Pa., has recently completed a 25,000 sq. ft. factory addition, to mark its 37th anniversary.

BUFFALO DISTRICT

Eastman Kodak Co., Kodak Park, Rochester, N. Y., has let general contract to Ridge Construction Co., Kodak Park, for six-story and basement addition to main camera works, totaling about 300,000 sq. ft. of floor space. Cost close to $600,000 with equipment.

Socony-Vacuum Oil Co., Inc., Genesee Building, Buffalo, has let contract to Smith & Caffrey Co., 2611 Lodi Street, Syracuse, N. Y., for structural steel for one-story bulk storage and distributing plant at Syracuse. Cost close to $50,000 with equipment.

Board of Public Utilities, City Hall, Jamestown, N. Y., T. V. McKee, secretary, has been authorized to arrange for bond issue of $1,200,000 for a municipal gas plant and distributing system. Estimates of cost will be secured soon.

NEW ENGLAND

Cuno Engineering Co., South Vine Street, Meriden, Conn., manufacturer of automobile equipment, industrial filters, etc., has let general contract to Industrial Construction Co., 721 Main Street, Hartford, Conn., for two-story and basement addition, 42 x 97 ft. Cost about $50,000 with equipment. Lorenzo Hamilton, Meriden, is architect.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Nov. 29 for 1000 pieces of gray iron castings and 1700 pieces of bronze castings (Circular 71), 48 pipe-type thermocouples, calorized (Circular 80), seamless steel tubing (Circular 86), 2850 filling oilers (oiler buffer), 3129 rectangular oils, 12-oz. capacity, 2946 one quart oil cans (Circular 82).

Coca-Cola Bottling Co., 477 Smith Street, Providence, R. I., has plans for new one-story mechanical-bottling plant on West Park Street. Cost about $45,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 30 for one motor-driven squaring shear (Schedule 2149) for Boston Navy Yard; 14 light-weight, two-wheel trucks, assembled, and 14 folding afterbody, light-weight stands, assembled (Schedule 2120) for Newport, R. I., Naval Station.

National Body Works, Inc., Hamlet Street, Woonsocket, R. I., manufacturer of automobile bodies, plans rebuilding part of plant recently destroyed by fire. Loss about $45,000 with equipment.

SOUTH ATLANTIC

Swift & Co., Union Stock Yards, Chicago, have acquired tract on Meadow Road, Asheville, N. C., for new three-story meat-packing plant, 100 x 100 ft. Cost close to $100,000 with equipment.

United States Engineer Office, Charleston, S. C., asks bids until Nov. 30 for pump parts, including engine side head ring liners, cast steel ring liners, bolts and flanges, gaskets, etc. (Circular 25).

Standard Oil Co., Pensacola, Fla., has filed plans for new wharf at foot of Barcelona Street, in connection with new bulk oil storage and distributing plant to be built at that location, to include pumping station, steel tanks and other facilities. Cost about $100,000 with equipment.

WASHINGTON DIST.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Dec. 1 for electric generating plant at Aiea Naval Reservation, Oahu, T. H., including gasoline engine-driven generator units, steel tanks, switchboards and accessory equipment, with station housing (Specifications 8531).

Frank L. Wight Distilling Co., Redwood and Light Streets, Baltimore, has asked bids on general contract for one-story addition to distillery at Lorely, Md., primarily for storage and distribution. Cost close to $50,000 with equipment.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Nov. 30 for extension joints, extra heavy flange (Circular 157).

Board of Street Commissioners, Hagerstown, Md., has plans for expansion and improvements in municipal electric power plant, including new generating unit and auxiliary equipment. Cost about $200,000. Appropriation has been authorized. Wood & Kirkpatrick, Stock Exchange Building, Philadelphia, are consulting engineers.

Southern Iron Works, Inc., Alexandria, Va., plans one-story steel fabricating shop at Union and Duke Streets. Cost close to $40,000 with equipment.

Montgomery County Board of Education, Rockville, Md., plans manual training department in new junior high school at Kensington, Md., for which bids are being asked on general contract until Nov. 30. Rhees E. Burkett, 726 Jackson Place, Washington, is architect. Cost about $125,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 30 for five motor-driven power presses (Schedule 2148) for Norfolk, Va., yard; one motor-driven automatic band resaw sharpener, and one motor-driven automatic circular saw, rip and crosscut sharpener (Circular 2163), one motor-driven turret lathe (Schedule 2154) for Philadelphia Navy Yard; 4500 lb. cast bearing bronze liners (Schedule 2121), 212 roller trunnion bearings (Schedule 2111) for Washington yard; one motor-driven heavy-duty engine lathe (Schedule 2130), one motor-driven heavy-duty radial drill (Schedule 2128), one motor-driven hollow chisel mortiser (Schedule 2129) for submarine base; one double-acting, steam-driven pile hammer, complete with driving caps and pulling rig (Schedule 2158) for Sewall's Point yard.

WESTERN PA. DIST.

Hookless Fasterner Co., Meadville, Pa., has approved plans for two one-story additions, 50 x 200 ft., and 80 x 100 ft., for expansion in machine shop division. Cost close to $100,000 with equipment. E. A. Besson and M. J. Bergen are company engineers.

Conemaugh Sanitary Mfg. Co., Blairsville, Pa., recently organized to manufacture cast iron enameled sanitary ware, has purchased former plant of Conemaugh Iron Works, and will remodel for new plant. Facilities will be provided for about 500 persons.

Erie Railroad Co., Meadville, Pa., has let general contract to Dresser Co., Arcade Building, Cleveland, for one-story addition to engine house and shops. Cost about $45,000 with equipment. Main offices are in Cleveland.

SOUTH CENTRAL

Southwestern Oil & Refining Co., Harry C. Clark, president, Weber Building, Lake Charles, La., recently organized with capital of $175,000, plans new oil refinery on local site, consisting of several units, with power house and steel tank storage and distributing facilities. Entire project will cost close to $115,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Dec. 1 for one to four drilling machines for 6-in. dia. holes, and one to four drilling machines for 9-in. dia.

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holes, for blast hole-drilling for Hiwassee dam.

Lookout Oil & Refining Co., Kirkland Avenue, Chattanooga, Tenn., manufacturer of cottonseed oil products, has approved plans for new steam power house at plant in Alton Park district. Cost over $100,000 with equipment. Company is a subsidiary of Armour & Co., Chicago.

United States Engineer Office, Memphis, Tenn., asks bids until Nov. 29 for dredge pump casings (Circular 125).

George R. Dempster, Knoxville, Tenn., city manager, asks bids until Nov. 30 for an electrical distributing system in North Knoxville, comprising about 190 miles of copper wire, poles and line equipment, hardware, fittings, etc. Cost about $175,000. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

SOUTHWEST

McDonald Machinery Co., 1531 North Broadway, St. Louis, has let general contract to W. C. Harting Construction Co., International Life Building, for one-story addition, 35 x 115 ft., for storage and distribution. Cost close to $40,000 with equipment.

Sterling Aluminum Products, Inc., 2914 North Market Street, St. Louis, has plans for one and two-story plant, 100 x 160 ft., at 2924 Benton Street. Cost over $50,000 with equipment. Edward J. Lawler, 6635 Delmar Boulevard, is architect.

Marley Co., 1915 Walnut Street, Kansas City, Kan., manufacturer of water towers and other water-cooling equipment, has asked bids on general contract for two-story plant in Fairfax district, 180 x 180 ft. on first floor and 40 x 180 ft. on second floor. Structure will be owned by Kansas City Industrial Land Co. and occupied under long-term lease. Cost close to $100,000 with equipment. Keene & Simpson, Land Bank Building, are architects.

City Council, Hollis, Okla., plans new municipal electric power plant. Bond issue of $135,000 has been authorized.

Roegelein Packing Co., 1701 South Brazos Street, San Antonio, Tex., meat packer, will ask bids soon on revised plans for one-story addition. Cost about $75,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

Stokely Brothers & Co., 2002 South East Street, Indianapolis, food canners and packers, have acquired about five-acre tract at Mercedes, Tex., for new branch plant, with power house. Cost close to $100,000 with equipment. Work will begin early in 1938.

OHIO AND INDIANA

Cimatool Co., 1517 East Third Street, Dayton, Ohio, manufacturer of dies, tools, special machinery and parts, has asked bids on general contract for new one and two-story works on Springfield Street, 200 x 361 ft. Cost over $150,000 with equipment. J. Douglas Lorenz, 330 West First Street, is architect.

Great Lakes Coca-Cola Bottling Co., 1235 Summit Street, Toledo, Ohio, has plans for new one and two-story and basement mechanical-bottling plant, 150 x 160 ft., with motor truck service and garage building adjoining, 80 x 160 ft. Cost over $100,000 with equipment. Hewlett & Best, Richardson Building, are architects.

Department of Public Utilities, City Hall, Cleveland, is considering report made by Peter F. Loftus, Oliver Building, Pittsburgh, consulting engineer, recommending new steam power plant at municipal steam-electric generating station on Fifty-third Street, with installation of boilers, pumps, coal-handling machinery and other equipment. Cost about $441,800. Frank O. Wallene is director.

C. L. Gauger Machine Co., Kent, Ohio, manufacturer of machinery and parts, has plans for one-story addition. Cost close to $35,000 with equipment. Charles Kistler, 105 East Main Street, is architect.

Contracting Officer, Materiel Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Nov. 30 for 212 propeller blade assemblies (Circular 427), seven gas cylinder testers (Circular 422), 20 9 ft. dia. propeller assemblies, 30 11½ ft. dia. propeller assemblies, and 30 constant speed control governors (Circular 410), 8500 lb. steel welding rods (Circular 420); until Dec. 1, washer head screws (Circular 426); until Dec. 2, flexible conduit reducers, cable coupling ends, conduits and plugs, retainers, etc. (Circular 411).

International Harvester Co. of America, Inc., 606 South Michigan Avenue, Chicago, motor truck division, has asked bids for foundations for new plant at 5699 Brookville Road, Indianapolis, including one-story foundry, 220 x 880 ft., one-story pattern shop, 66 x 154 ft., two-story unit, 66 x 198 ft., and one-story, 100 x 308 ft., both for storage and distribution. Superstructure will begin early in 1938. Cost over $700,000 with equipment. Otto A. Krueger is company engineer, first noted address.

MICHIGAN DISTRICT

American Blower Corp., Dearborn, Mich., is erecting a new plant unit 245 x 436 ft., on its 17-acre site at a cost of about $190,000. Austin Co., Detroit, is general contractor.

Monguagon Township School District, Trenton, Mich., has plans for one-story addition to Slocum-Truax high school, for a vocational training department. Bond issue of $59,000 has been authorized. Work is scheduled to begin in December.

Hamburg Mfg. Co., Hamburg, Mich., recently organized by W. Rex Johnston, 1423 Longfellow Avenue, Detroit, and associates, to manufacture screw machine products, has acquired about 10-acre tract at Hamburg, fronting on line of Ann Arbor Railroad, for new plant. Initial unit will be one-story, 90 x 160 ft. Cost about $45,000 with equipment. Other units will be built later.

Electromaster, Inc., 1801 East Atwater Street, Detroit, manufacturer of porcelain enameled electric ranges, parts, etc., has plans for one and two-story addition. Cost close to $125,000 with equipment. Giffels & Vallet, Inc., and L. Rossetti, Marquette Building, are associated architects and engineers.

Michigan Fruit Canners' Association, Benton Harbor, Mich., has plans for one-story building for storage and distribution. Cost about $35,000 with equipment.

MIDDLE WEST

Fruehauf Trailer Co., 10940 Harper Avenue, Detroit, motor trailers and parts, has let general contract to G. Kehl Sons, 1225 North Maplewood Avenue, Chicago, for one-story factory branch and service building, 100 x 270 ft., at 2553-79 Archer Avenue, Chicago. Cost about $60,000 with equipment.

Stewart-Warner Corp., 1828 West Diversey Parkway, Chicago, automotive equipment, electric refrigerators, etc., has purchased former plant No. 2 of Marmon Motor Car Co., Indianapolis, consisting of 22-acre tract improved with four main buildings, totaling about 539,000 sq. ft. of floor space. Plant will be remodeled for refrigerator-manufacturing division and present plant at Chicago will be removed to new location. Cost over $100,000 with equipment. Stewart-Warner Co. of Indiana, Inc., a subsidiary, will be organized to operate new plant.

Quad City Coca-Cola Co., Twenty-eighth Street and Fifth Avenue, Rock Island, Ill., has asked bids on general contract for one and two-story mechanical-bottling works, 140 x 140 ft. Cost over $75,000 with equipment. R. C. Sandberg, Rock Island Bank Building, is architect.

Board of Education, Iowa City, Iowa, plans manual training department in new two-story and basement high school, for which bond issue of $725,000 has been authorized. Hamilton, Fellows & Nedved, Tower Court Building, Chicago, are architects.

Lignite Products Corp. of America, Inc., Minot, N. D., plans early rebuilding of part of plant recently destroyed by fire. Loss close to $150,000 with equipment.

Common Council, Freeman, S. D., asks bids until Dec. 8 for equipment for new municipal electric power plant and distributing system. Fund of $98,000 has been arranged. Buell & Winter Engineering Co., Insurance Exchange Building, Sioux City, Iowa, is consulting engineer.

McElwee Packing Co., foot of Sanger Street, Peoria, Ill., food products, plans rebuilding of portion of canning and packing plant recently destroyed by fire. Loss about $50,000 with equipment.

Western Malleables, Inc., Beaver Dam, Wis., plant and other assets were bid in for $87,500 by Louis Cohen, Chicago attorney, at sheriff's sale on Nov. 16, under foreclosure brought by Central Wisconsin Trust Co. Sale is subject to final approval of Dodge County Circuit Court. There were but two bidders. Mr. Cohen, it is understood, is representing a firm of Chicago liquidators, but future plans for the plant have not been disclosed. Western Malleables at one time employed 1400 persons and its 1935 payroll amounted to $412,790. Plant was permanently closed Sept. 29, 1936, at which time about 350 employees were dismissed. It was stated then that reason for closing was due to highly competitive condition of the malleable casting industry. Early this year a receivership was instituted, with A. O. Vinz of Beaver Dam as receiver. Effort to reorganize corporation was unsuccessful and in September foreclosure sale was ordered.

PACIFIC COAST

Citrus Machinery Co., Twelfth Street and Pachappa Avenue, Riverside, Cal., manufacturer of fruit packing machinery and parts, has plans for one and two-story plant unit, 240 x 260 ft. Cost close to $100,000 with equipment, which will include an electric traveling crane. Herbert A. Hamm, 579 Holliston Avenue, Pasadena, Cal., is engineer. Jesse Beeson will supervise erection.

Bureau of Reclamation, Denver, asks bids until Dec. 1 for two 13-ft. 4-in. x 12-ft. radial gates, and two 7500-lb. double-drum, motor-driven radial hoists for installation at inlet to Pomona siphon, Yakima Ridge Canal, Roza Division, Wash. (Specifications 933-D); until Dec. 2, two 219-ft. x 16-ft. radial gates, and two 16,000-lb. double-drum, motor-driven radial gate hoists for installation in spillway at Boca dam, Truckee Storage Project, Nevada-California (Specifications 994-D).

Coca-Cola Bottling Co., Wilson and Roosevelt Streets, Stockton, Cal., has let general contract to E. Merio, route 2, Stockton, for one and two-story addition to merchanical-bottling plant, 72 x 140 ft. Cost over $60,000 with equipment. J. U. Clowdsley, Exchange Building, is architect.

Board of Education, Riverside, Cal., has authorized plans for one-story vocational shop at Polytechnic High School, about 15,000 sq. ft. of floor space. Cost about $60,000. G. Stanley Wilson, Mission Inn, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 30 for one motor-driven, heavy-duty lathe (Schedule 2116), one motor-driven tool-makers' lathe (Schedule 2115); until Dec. 3, one motor-driven precision bench lathe (Schedule 2134), parts for airplanes (Schedule 900-1229), exhaust collector rings for airplanes (Schedule 900-1239), one sand-blast cabinet (Schedule 2133) for San Diego Naval Air Station.

Western Bottling Co., 804 East Sprague Street, Spokane, Wash., has plans for one-story and basement addition to mechanical-bottling plant, 100 x 150 ft. Cost over $60,000 with equipment.

Latta Brothers, 2321 Northlake Avenue, Seattle, manufacturers of mechanical equipment, auto parts, etc., plan one-story machine shop, 30 x 54 ft. Cost about $30,000 with equipment. Harold Adams, Securities Building, is architect.

FOREIGN

Munro & Miller, Ltd., Govan, Glasgow, Scotland, operating Moorepark Tube Works, manufacturer of steel tubing, heating equipment, etc., has plans for several one-story units for increased production. Cost close to $500,000 with equipment.

Swabian Cellulose & Staple Fibre Co., Ltd., Wurttemberg, Germany, recently organized, has plans for new works near Wurttemberg for production of cellulose products, using beechwood as raw pulp material. It will include power house, pumping station and other mechanical divisions. Cost close to $500,000 with machinery. Later, company will build plant on adjoining site for production of staple fiber, to cost close to $300,000 with equipment.

Department of Government Railways, Melbourne, Victoria, Australia, asks bids until Dec. 22 for two steam boilers and accessories for power house.

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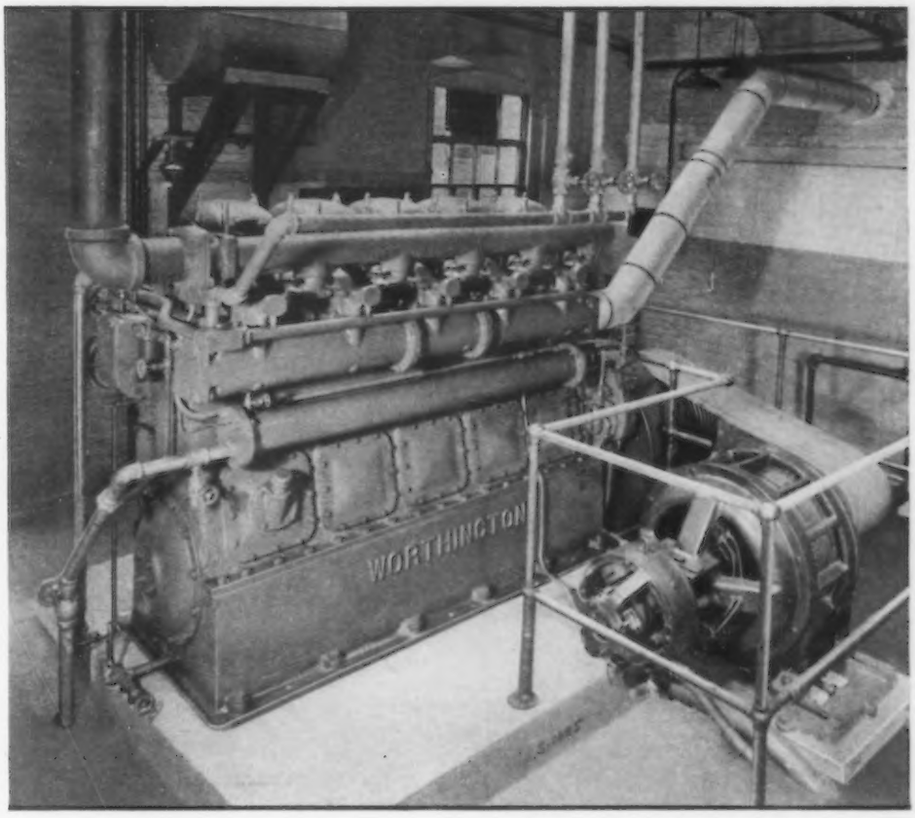

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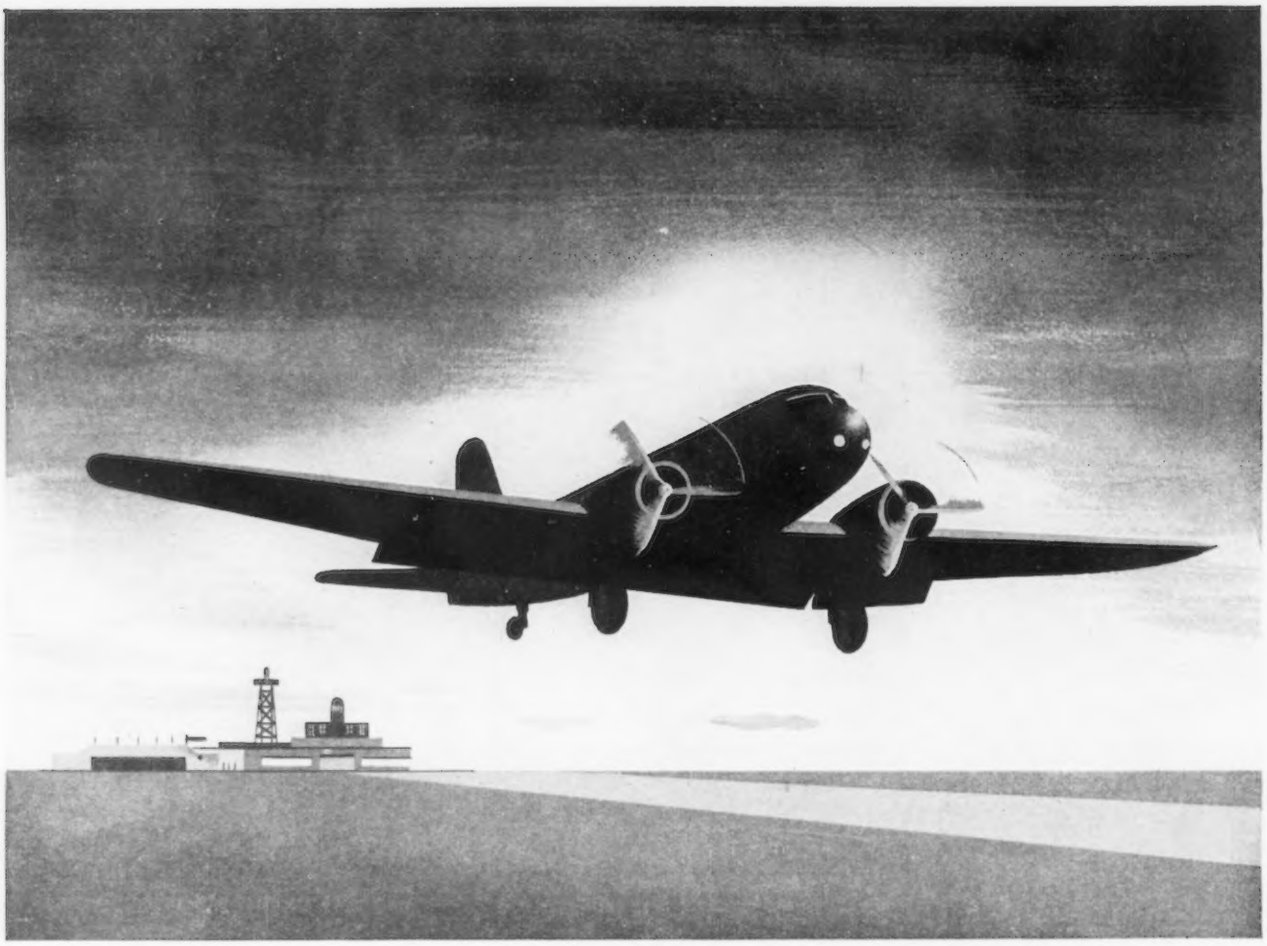

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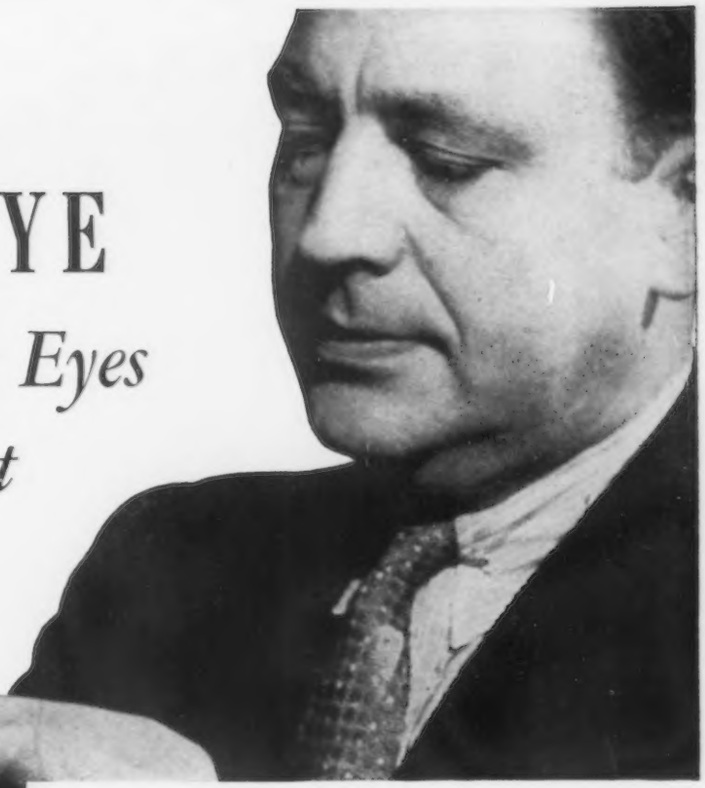

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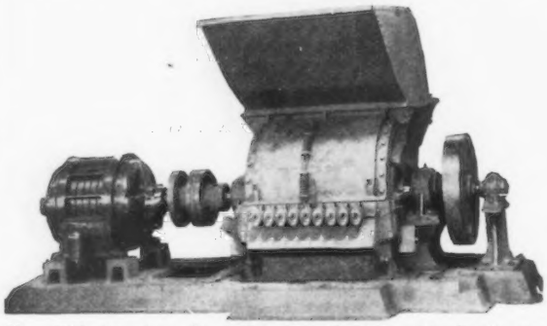

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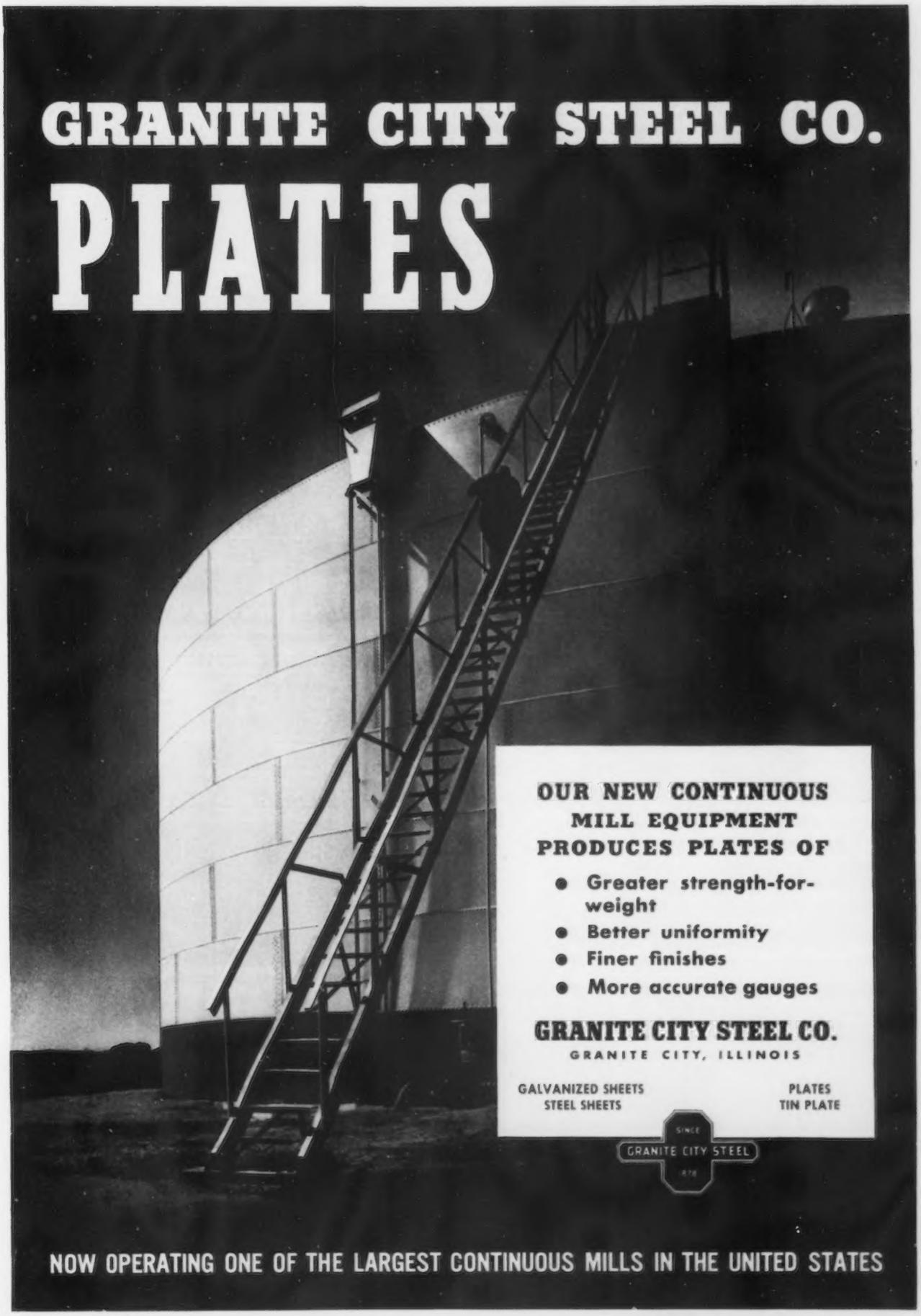
PLATES



OUR NEW CONTINUOUS MILL EQUIPMENT PRODUCES PLATES OF

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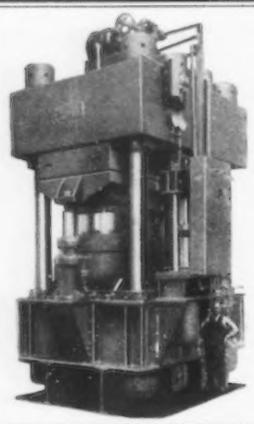

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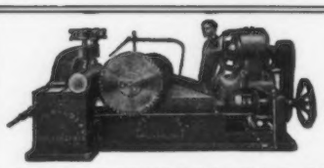
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y.; also Buffalo, N. Y.
Pennsylvania: Arch Machinery Co., 1029 Park Bldg., Pittsburgh, Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif. Eccles & Davis Machinery Co., Inc., 1910 Santa Fe Avenue, Los Angeles, California.
Arthur Jackson Machine Tool Company, 60 Front Street West., Toronto 2, Canada, and 437 Grosvenor Avenue, Westmount, Que.



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See our Advt., page 220, April Machinery.

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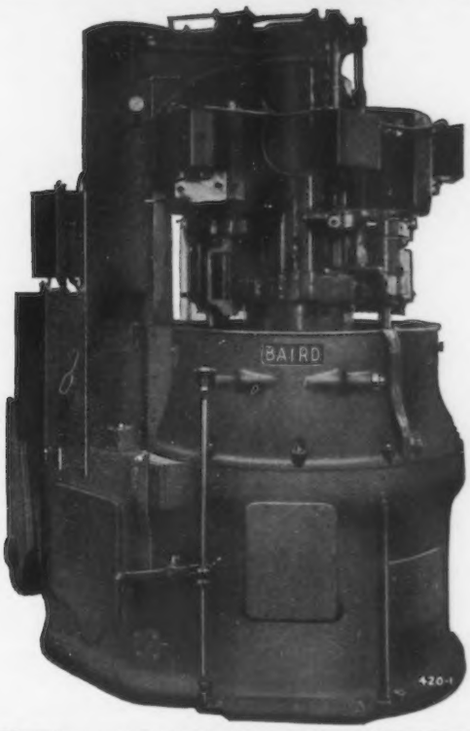
New Industrial Literature!

This is the title of a page in this issue reviewing new catalogs, bulletins, etc. See index for page number.

BAIRD MACHINE COMPANY

BRIDGEPORT, CONNECTICUT



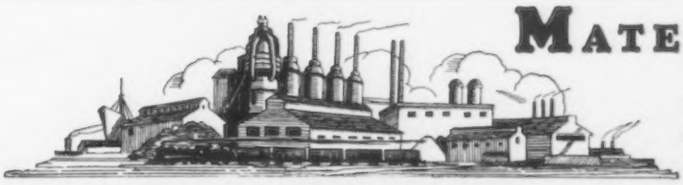
Like Baird Automatic Lathes and Chucking Machines, Baird Grinders are built both horizontal and vertical. Mechanical features are the same plus automatic truing and sizing of grinding wheels.

Wheels may be adjusted or changed at any station without disturbing the others and different sized wheels may also be used. Additional flexibility of operation is afforded by the fact that different diameters may be ground with one pass through the machine and by means of swivel heads which are provided for angular grinding.

Let our engineers study your own particular problem and make specific recommendations.

Baird Automatic Multiple Spindle

GRINDERS



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AGENTS:—

Lapham Hickey Co.—3333 W. 47th Place, Chicago, Ill.—414 United Artists Bldg., Detroit, Mich.
E. F. Krause & Co.—430-440 Commercial St., Los Angeles, Calif.
Hill Chase & Co.—Richmond and Ontario Sts., Philadelphia, Pa.
Wetherell Bros. Co.—251 Albany St., Cambridge, Mass.

JUST BETWEEN US TWO

Everyone But Us Had a Cloud

IN his *New Yorker* criticism of the play "Amphitryon 38," Robert Benchley says:

> *" . . . the fact that you have already seen startling reproductions of Alfred Lunt . . . reclining on an Olympian cloud in every magazine except The Iron Age may take away the initial shock of the prologue."*

Heck, we could have had one, too. But we're holding out for Lynn.

Punctuation Dept.

THE paragraph on over-use of the exclamation point moves Charles *(International Nickel)* McKnight to inform us that the Spanish have the peculiar habit of placing a question mark before and after a question. *"Maybe they also do it with ! A good idea,"* he says.

¡A capital idea! It enables you to get yourself keyed up in advance for something startling, for nothing is more annoying than to read a four or five line sentence, and then find a pulse-raising punctuation mark at the end of it. You have to read the sentence over again to find what the excitement is all about. But by that time the first fine careless rapture has passed, like making a highball from the remains of last night's bottle of club soda.

But Not Snack, Snow and Snug

IF you majored in etymology don't tell us but let us guess why so many words beginning with "sn" have a disagreeable meaning—*snag, snail, snap, snare, snarl, snatch, sneak, sneer, sneeze, sniff, snivel, snob, snore, snub, snuffle.*

An exaggerated pronunciation of a sibilant followed by a nasal causes an unpleasant facial distortion. Therefore, our guess is old John H. Anglo-Saxon's snorts came to designate, onomatopoetically, the things he didn't like.

To stave off a blast from the Oberleutnant to the effect that this has nothing whatever to do with the industry, we hasten to add that we see by your favorite family journal that the Pacific Car & Foundry Co. is fabricating shapes for a bridge at Nasal River, Wash.

ADV.

WE picked that last up in the market section, which ordinarily we regard as something less than thrilling. Lately, however, we have taken to reading every word of the market reports, finding that they give more exact and up-to-the-minute information on the business situation than does anything else we have yet run across.

Here are the first-hand hot-off-the-platter facts which are warmed over and dished up weeks later by business surveyors and forecasters. Weeks after that they reach the canned statistical stage. Getting your facts first hand may not endow you with absolute omniscience and infallibility, but you'll find yourself calling the turns at least like a sixth son.

Bareskin Concealers Use Reader Service

YOU remember Munsingwear—the people who used to advertise the ambitious underwear that never stopped until it hit the wrist and ankle bones. Well, they just wrote in for a clipping of an Iron Age article, making us think that maybe they are going to start making chain mail undershirts and shorts for G men.

More Than Four Out of Five Say "We Love You"

THE brass hats in the trade paper field judge the value of a trade paper to its readers by the proportion of readers who come back for more. If the percentage is high, they talk about it publicly. If it is low, they discuss it privately with their editors.

Just to make sure that we are on the right track in refusing to let our renewal proportion waste its fragrance in the office files, we added up the 1937 expirations on which we have complete renewal records. Of the 5,749 expirations, we find that 4,623 have renewed (paid for). That figures up to over 80 per cent. We thought it would.

Gas Works Gal Goes Phonetic

A LETTER sent to The Iron Age by the Ohio Society of New York is addressed to "D. R. & H." The "R. & H" for "Iron Age" we can forgive, but the corruption of our "The" to "D" gripes us no end. It makes us almost wish we were born in Ohio so that we could resign from dee Society.

—A.H.D.

Products Index

ABRASIVE WHEELS — See Grinding Wheels

ABRASIVE CLOTH & PAPER
Norton Co., Worchester, Mass.

ABRASIVES—Steel Shot and Grit
Pangborn Corporation, Hagerstown, Md.

ACCESSORIES—Welding
Lincoln Electric Co., The, Cleveland.

ACCUMULATORS—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Hydraulik Gmbh. Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Wood, R. D., & Co., Philadelphia.

ACETYLENE—Dissolved in Cylinders & Small Tanks
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

ACID-PROOF CEMENT
Haveg Corporation, Newark, Delaware.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ACID-PROOF CONSTRUCTION
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

AIR CONDITIONING EQUIPMENT
American Blower Corp., 6000 Russell St., Detroit

AIRMETERS AND VOLTMETERS
Weston Electrical Instrument Corp., Newark, N. J.

AIR TANKS AND CYLINDERS
Scaife, William B., & Sons Co., Pgh.

ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.

ALLOYS—Ferro
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Magnesium
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.

ALLOYS—Resistance Welding
Electroloy Co., Inc., 50 Church St., New York City.

ALLOYS—Titanium
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

ALLOYS—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

ALLOYS—Vanadium
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

ALLOYS—Zinc Base Die Casting
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ALUMINUM
Aluminum Co. of America, Pittsburgh.
Seligman, Arthur, & Co., Inc., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.

AMMETERS AND VOLTMETERS—Recording
Leeds & Northrup Co., Philadelphia.

AMMONIA RECOVERY PLANTS
Koppers Co., Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ANNEALING—See Heat Treating

ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
United Engineering & Fdry. Co., Pgh.

ANNEALING COVERS
Surface Combustion Corp., 2375 Dorr St., Toledo.
Wilson, Lee Engineering Co., The, Cleveland.

ANODES—All Types
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Seymour (Conn.) Mfg. Co.
Udylite Co., The, Detroit.

ANODES—Cadmium
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

APPAREL—Welding
Lincoln Electric Co., The, Cleveland.

ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARMORING MACHINERY—Cable, Wire, Hose
Sleeper & Hartley, Inc., Worcester, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., Chicago.

ASBESTOS
Carey, Philip, Co., The, Cincinnati.

AXLES—Car or Locomotive
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BABBITT METALS
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.

BALANCING MACHINES — Static Dynamic
Gisholt Machine Co., Madison, Wis.
Olsen, Tinius Testing Machine Co., Philadelphia.

BALING PRESSES—Scrap — See Presses —Baling

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Acme Steel Co., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Ransohoff, N., Inc., Cincinnati.

BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Ransohoff, N., Inc., Cincinnati.
Whiting Corp., Harvey, Ill.

BARS—Alloy
Republic Steel Corp., Cleveland, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
USL Battery Corp., Niagara Falls, N. Y.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.

Products Index

New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.

BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Lawrenceville Bronze Co., Pittsburgh.
National Bearing Metals Corp., Pittsburgh.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.
Richardson Co., The, Melrose Park, Ill.

BEARINGS—Quill
Bantam Bearings Corp., The, South Bend, Indiana.

BEARINGS—Radial
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Roll Neck
Bantam Bearings Corp., The, South Bend, Indiana.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Bearings Corp., The, South Bend, Indiana.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Standard Machinery Co., Providence, R. I.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Bearings Corp., The, South Bend, Indiana.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Indiana.
Richardson Co., The, Melrose Park, Ill.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Self-aligning Roller
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Shaft Hanger
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Thrust
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Timken Roller Bearing Co., The, Canton, O.

BELT DRESSING
Rhoads, J. E., & Sons, Philadelphia.

BELT LACING
Rhoads, J. E., & Sons, Philadelphia.

BELT—Conveyor, Elevator
Goodyear Tire & Rubber Co., Akron, Ohio.
Goodrich, B. F., Co., The, Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BELTING CEMENT
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Metal, Conveyor, High and Low Temperature
Acme Steel Co., Chicago, Ill.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

BELTING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

BELTS—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BENDING MACHINES—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

BENDING MACHINES—Hand and Power
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Kane & Roach, Inc., Syracuse, New York.
Niagara Machine & Tool Works, Buffalo, N. Y.

BENZOL RECOVERY PLANTS
Koppers Co., Pittsburgh.

BERYLLIUM COPPER
American Brass Co., The, Waterbury, Conn.

BILLETS—Chrome Nickel Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Chrome Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.

BILLETS—Re-rolling
Alan Wood Steel Co., Conshohocken, Pa.

BILLETS—Steel
Bethelhem (Pa.) Steel Company.
Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BIMETAL—Thermostatic
Chace, W. M., Co., 1695 Beard Ave., Detroit.

BINS—Rotating
Frick-Gallagher Mfg. Co., The, Wellston, Ohio.

BLANKS—Chisel
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Richardson Co., The, Melrose Park, Ill.

BLANKS—Gear, Silent Steel
Waldron, John, Corp., New Brunswick, N. J.

BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

BLAST FURNACES
Brassert, H. A., & Co., Chicago, Ill.

BLAST GATES
Rockwell, W. S., Co., 50 Church St., N. Y. C.

BLOCKS—Chain
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

BLOWERS
American Air Filter Co., Inc., Louisville, Ky.
American Blower Corp., 6000 Russell St., Detroit.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
North American Mfg. Co., The, Cleveland.
Spencer Turbine Co., Hartford, Conn.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

BLOWPIPES — Soldering, Heating, Annealing
American Gas Furnace Co., Elizabeth, N. J.
Weldit Acetylene Co., Detroit.

BOILERS
Munroe R., & Sons Mfg. Corp., Pittsburgh.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOLT CUTTERS
Acme Machinery Co., Cleveland.
Landis Mch. Co., Inc., Waynesboro, Pa.

BOLT AND NUT MACHINERY
Acme Machinery Co., Cleveland.
Ajax Mfg. Co., The, Euclid, Ohio.
Landis Machine Co., Inc., Waynesboro, Pa.
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

BOLT & RIVET CLIPPERS
Bremil Mfg Co., Erie, Pa.
Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine
Cleveland (Ohio) Cap Screw Co., The
Erie (Pa.) Bolt & Nut Co.
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

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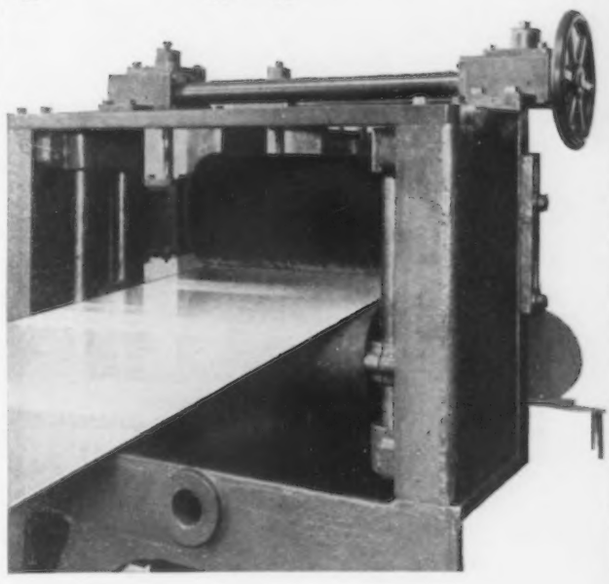

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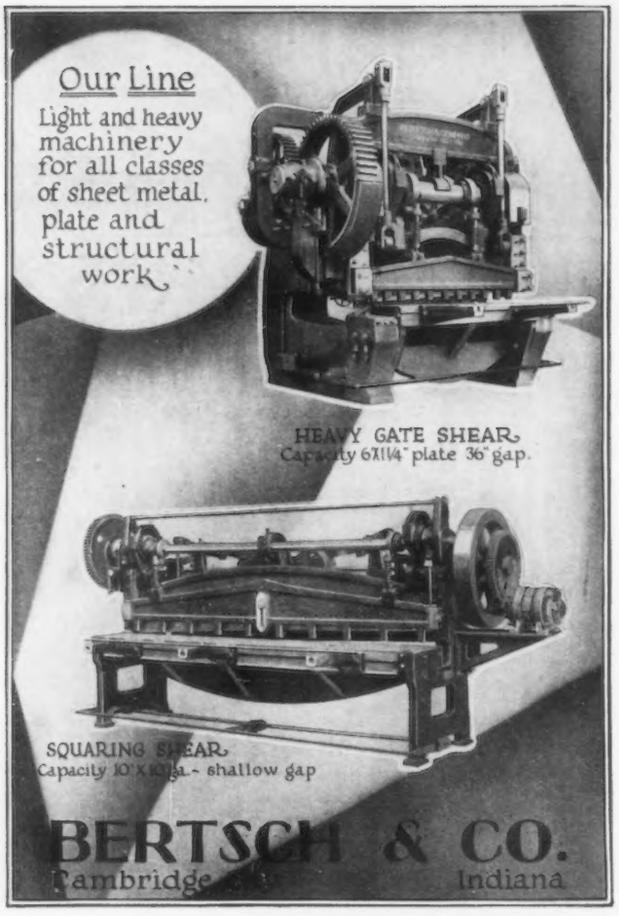

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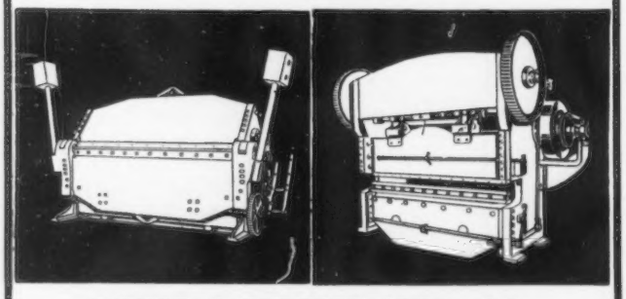

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Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special, Hot or Cold Upset
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BOLTS—Stove
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Clark Bros. Bolt Co., Milldale, Conn.
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Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

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Lucas Machine Tool Co., Cleveland.
National Automatic Tool Co., Richmond Ind.

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Bullard Co., The, Bridgeport, Conn.

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Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

BORING MACHINES—Diamond & Carbide Tools
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BRICK—Fire Clay
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Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
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BUCKETS—Electric Motor
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BUCKETS—Orange Peel
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Bethlehem (Pa.) Steel Co.
Blaw-Knox Co., Pittsburgh.
Ferguson, H. K., Co., The, Cleveland.
Iron & Steel Products, Inc., Chicago.

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Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Steelweld Machinery Co., Cleveland.

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Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Lawrenceville Bronze Co., Pittsburgh.
Phosphor Bronze Smelting Co., The, Phila.
Shenango-Penn Mold Co., Pittsburgh.

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Phosphor Bronze Smelting Co., The, Phila.

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Udylite Co., The, Detroit.

CADMIUM PLATING PROCESS
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

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Bartlett, C. O.-Snow Co., The, Cleveland.

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Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
Electro Alloys Co., Elyria, Ohio.
Hoskins Mfg. Co., Detroit, Mich.
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Bissett Steel Co., The, Cleveland.
Dodge Steel Co., Philadelphia, Pa.
Electro Alloys Co., Elyria, Ohio.
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Carbon Malleable Casting Co., Inc., Lancaster, Pa.
Lawrenceville Bronze Co., Pittsburgh.
National Bearing Metals Corp., Pittsburgh.
Phosphor Bronze Smelting Co.,The, Phila.
Snyder, W. P., & Co., Pittsburgh.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

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Electro Alloys Co., Elyria, Ohio.
Meehanite Metal Corp., Pittsburgh.
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CASTINGS—Electric Steel
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North Wales (Pa.) Mach. Co., Inc.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

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CASTINGS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

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Baltimore (Md.) Malleable Iron & Steel Casting Co.
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Laconia (N. H.) Malleable Iron Co., Inc.
Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.
Malleable Iron Fittings Co., Branford, Ct.
Peoria (Ill.) Malleable Castings Co.

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Malleable Iron Fittings Co., Branford, Ct.

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Bethlehem (Pa.) Steel Company.
Birdsboro (Pa.) Steel Foundry & Machine Co.
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Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Commercial Steel Casting Co., Marion, Ohio.
Crucible Steel Castings Co., Lansdowne,Pa.
Dodge Steel Co., Philadelphia, Pa.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
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Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

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Johns-Manville Corp., 22 East 40th St., New York City.
Quigley Co., Inc., 56 West 45th St., N. Y. C.

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Bartlett, C. O.-Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Webster Mfg. Co., Chicago.

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Boston Gear Works, Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Ramsey Chain Co., Inc., Albany, N. Y.
Webster Mfg. Co., Chicago.
Whitney Chain & Mfg. Co., Hartford, Ct.

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Bartlett, C. O.-Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co. Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

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Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Ramsey Chain Co., Inc., Albany, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

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Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
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Udylite Co., The, Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

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National Acme Co., The, Cleveland.

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Hannifin Mfg. Co., Chicago.

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Cushman Chuck Co., Hartford, Conn.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—Electric
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CHUCKS—Lathe
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Magnetic
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Taft-Peirce Mfg. Co.,The,Woonsocket,R.I.

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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

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Detroit Rex Products Co., Detroit, Mich.
Ford, J. B., Co., The, Wyandotte, Mich.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Phila., Pa.

CLEANING COMPOUNDS—Alkali
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Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

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Detroit Rex Products Co., Detroit, Mich.

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Bullard Co., The, Bridgeport, Conn.

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Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

CLOTHING—Asbestos & Fireproof
Safety Equipment Service Co., Cleveland.

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Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES
Fairbanks, Morse & Co., Chicago.
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, New York.

CLUTCHES—Magnetic
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Dings Magnetic Separator Co., Milwaukee.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

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Hanna Furnace Corp., The, Detroit, Mich.
Koppers Coal Co., Inc., The, Pittsburgh.
Pickands Mather & Co., Cleveland.

COAL, ORE AND ASH HANDLING MACHINERY
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Robins Conveying Belt Co., 15 Park Row, N. Y. C.
Webster Mfg. Co., Chicago.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

COILS—Pipe
Harrisburg (Pa.) Steel Corp.

COKE—Metallurgical
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Pickands Mather & Co., Cleveland.

COKE OVEN MACHINERY
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Koppers Co., Pittsburgh.

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COLUMBIUM
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Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
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Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Fairbanks, Morse & Co., Chicago.
Hobart Bros., Troy, Ohio.
Ingersoll-Rand Co., 11 Broadway, New York City.
Pennsylvania Pump & Compressor Co., Easton, Pa.
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Westinghouse Air Brake Co., Industrial Div., Pittsburgh.
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Worthington Pump & Machinery Corp., Harrison, N. J.

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Electric Controller & Mfg. Co., The, Cleveland.
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Brown Instrument Co., The, Philadelphia, Pa.
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Leeds & Northrup Co., Philadelphia.

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Bartlett, C. O.-Snow Co., The, Cleveland.
Link-Belt Co., Chicago.
Logan Co., Inc., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

CONVEYOR WORMS
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—Gravity
Logan Co., Inc., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.

CONVEYORS—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

CONVEYORS—Portable
Farquhar, A. B., Co., Ltd., York, Pa.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

COPING MACHINES
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS — See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, Cleveland.
Western Wire Prods. Co., St. Louis, Mo.

COUNTERBORES
Cleveland (Ohio) Twist Drill Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTERS—Production
Durant Mfg. Co., Milwaukee, Wis.
Veeder-Root, Inc., Hartford, Ct.

COUNTERS—Revolution, Recording
Durant Mfg. Co., Milwaukee, Wis.

COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS—Air Hose
Cleveland (Ohio) Pneumatic Tool Co., The.

COUPLINGS—Cut-off Friction
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.

COUPLINGS—Flexible
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., Chicago.
Morse Chain Co., Ithaca, New York.
Poole Foundry & Mch. Co., Baltimore, Md.
Ramsey Chain Co., Inc., Albany, N. Y.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS—Pipe
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

CRANES—Crawling Tractor
Browning Crane & Shovel Co., Cleveland.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, Ohio.

CRANES — Electric, Industrial, Truck Mounted
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Browning Crane & Shovel Co., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANES—Electric Traveling
Armel, James P., Pittsburgh.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Conco Engineering Works, Mendota, Ill.
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Electric Hoist & Motor Co., 149 N. 9th St., Bklyn., N. Y.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Maris Brothers, Inc., Philadelphia.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, Detroit, Mich.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES—Gantry
Browning Crane & Shovel Co., Cleveland.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Whiting Corp., Harvey, Ill.

CRANES—Hand Power
American Monorail Co., The, Cleveland.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Conco Engineering Works, Mendota, Ill.
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Maris Brothers, Inc., Philadelphia.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

CRANES—Jib
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of the Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Conco Engineering Works, Mendota, Ill.
Euclid Crane & Hoist Co., The, Euclid, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Whiting Corp., Harvey, Ill.

CRANES—Locomotive
Browning Crane & Shovel Co., Cleveland.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, O.

CRANES—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Portable
Canton Fdry. & Mch. Co., Cleveland.

CRANES—Portable Electric
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANKSHAFTS
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Union Drawn Steel Co., Massillon, Ohio.

CRANKSHAFTS—Forged
Bay City Forge Co., Erie, Pa.

CRUSHERS—Coal
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CRUSHERS—Steel Turning
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CUTTERS—Die Sinking
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Tomkins-Johnson Co., The, Jackson, Mich.

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CUTTERS—Keyseating
Davis Keyseater Co., 400 Exchange St. Rochester, N. Y.

CUTTERS—Milling
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland (Ohio) Twist Drill Co., The.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

CUTTING-OFF MACHINES—Abrasives
Tabor Mfg. Co., Phila.

CUTTING-OFF MACHINES—Cold Saw
Espen-Lucas Mch. Wks., Philadelphia.

CUTTING-OFF MACHINES—Pipe or Tubing
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Bardons & Oliver, Cleveland.
Landis Mch. Co., Inc., Waynesboro, Pa.

CUTTING AND WELDING APPARATUS—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene.

CYLINDERS — Compressed Air & Hydraulic
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Tomkins-Johnson Co., The, Jackson, Mich.

CYLINDERS—Seamless
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

DEGREASING COMPOUNDS
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

DEGREASING MACHINES—Solvent
Detroit Rex Products Co., Detroit, Mich.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

DICTATING MACHINES
Dictaphone Sales Corp., 420 Lexington Ave., New York City.

DIE-FILING MACHINES
Continental Machine Specialties, Inc., Minneapolis, Minn.

DIE SETS
U. S. Tool Co., Inc., Ampere, N. J.

DIE SINKING MACHINES — Automatic and Hand
Cincinnati (Ohio) Milling Mch. Co., The.
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.

DIEING MACHINES—Automatic
Henry & Wright Mfg. Co., The, Hartford, Conn.

DIES—Cast Tool Steel
Forging & Casting Corp., The, Ferndale, Mich.

DIES, JIGS, FIXTURES, etc.
Atlantic Mfg. Co., Philadelphia.
Taft-Peirce Mfg. Co.,The,Woonsocket,R. I.

DIES—Pipe Threading
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Self-Opening Adjustable
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.

DIES—Sheet Metal Working
Worcester (Mass.) Stamped Metal Co.

DIES—Steel Letters and Stamps
Cunningham, M. E., Co., Pittsburgh.
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

DOORS & SHUTTERS, Fireproof
Kinnear Mfg. Co., Columbus, Ohio.

DOORS & SHUTTERS—Steel or Wood Rolling
Kinnear Mfg. Co., Columbus, Ohio.

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DRILL FILING SYSTEMS
Huot Mfg. Co., 500 Robert St., St. Paul, Minn.

DRILL HEADS—Hydraulic
National Automatic Tool Co.,Richmond,Ind.

DRILL HEADS—Multiple
Baker Bros., Inc., Toledo, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

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Huot Mfg. Co., 500 Robert St., St. Paul, Minn.

DRILLING MACHINES—Bench
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Heavy Duty
Baker Bros., Inc., Toledo, Ohio.

DRILLING MACHINES—Multiple Spindle
Baker Bros., Inc., Toledo, Ohio.
Henry & Wright Mfg. Co., The, Hartford Conn.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Multiple Spindle Adjustable
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Multiple Spindle Horizontal
Baker Bros., Inc., Toledo, Ohio.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Portable Electric
Black & Decker Mfg. Co., The, Towson, Md.
Wodack Electric Tool Corp., Chicago.

DRILLING MACHINES—Portable Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Helwig Mfg. Co., St. Paul, Minn.
Ingersoll-Rand Co., 11 Broadway, New York City.
Warner & Swasey Co., The, Cleveland.

DRILLING MACHINES—Radial
Cincinnati (Ohio) Bickford Tool Co., The.

DRILLING MACHINES—Sensitive
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Upright
Baker Bros., Inc., Toledo, Ohio.
Cincinnati (Ohio) Bickford Tool Co., The.

DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Cincinnati (Ohio) Bickford Tool Co., The.

DRIVES—Gear
Farrel-Birmingham Co., Inc.,Buffalo,N.Y.
Mesta Mch. Co., Pittsburgh.

DRIVES—Single & Multiple V-Belts
Allis Chalmers Mfg. Co., Milwaukee.

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DROP HAMMERS—See Hammers—Drop

DUST COLLECTORS
Abrasive Machine Tool Co., East Providence, R. I.
American Air Filter Co., Inc., Louisville, Ky.
American Blower Corp., 6000 Russell St., Detroit.
American Foundry Equipment Co., The, 101 Bykrit St., Mishawaka, Ind.
Blaw-Knox Co., Pittsburgh.
Pangborn Corporation, Hagerstown, Md.
Whiting Corp., Harvey, Ill.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

ELECTRIC HEATING ELEMENTS
Globar Div., The Carborundum Co., Niagara Falls, N. Y.

ELECTRIC LIGHTING—Industrial
General Electric Co., Cleveland.
General Electric Vapor Lamp Co., Hoboken, N. J.

ELECTRIC WELDING — See Welding — Electric

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Allis-Chalmers Mfg. Co., Milwaukee.
General Electric Co., Schenectady, N. Y.

ELECTRICAL MACHINERY — Second Hand. (See Clearing House Section)

ELECTRICAL WIRES
Roebling's, John A., Sons Co., Trenton, N. J.

ELECTRODE HOLDERS—Welding
Lincoln Electric Co., The, Cleveland.

ELECTRODES—Resistance Welding
Electroloy Co., Inc., 50 Church St., New York City.

ELECTRODES—Welding, Coated
Electric Arc Cutting & Welding Co., The, Newark, N. J.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Una Welding, Inc., Cleveland, Ohio.

ELECTROPLATING EQUIPMENT & SUPPLIES
Udylite Co., The, Detroit.

ELEVATORS—Portable
Barrett-Cravens Co., Chicago, Ill.
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

ELEVATORS—Steam Hydraulic
Ridgway, Craig, & Son Co., Coatesville, Pa.

EMERY WHEELS—See Grinding Wheels

ENGINEERS & CONTRACTORS
Ferguson, H. K., Co., The, Cleveland.

ENGINEERS—Consulting and Industrial
Koppers Co., Pittsburgh.

ENGINES—Diesel
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES—Gas
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES—Oil
Worthington Pump & Machinery Corp., Harrison, N. J.

EYELET MACHINES
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

FACING CLAY
Carborundum Co., The, Perth Amboy, N.J.

FACTORY & PLANT SITES
Zoll, Edward H., 196 Market St., Newark, N. J.

FANS—Ventilating
American Blower Corp., 6000 Russell St., Detroit.
DeVilbiss Co., The, Toledo, Ohio.

FEED WATER HEATERS AND PURIFIERS
Harrisburg (Pa.) Steel Corp.

FEEDS—Hydraulic, for Machines
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

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American Felt Co.,315 Fourth Ave.,N.Y.C.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROMANGANESE
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Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
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Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
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Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

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Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON ALUMINUM
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSPIEGELEISEN
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

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Titanium Alloys Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

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Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

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Disston, Henry, & Sons, Inc., Philadelphia.
Nicholson File Co., Providence, R. I.

FILING MACHINES
Continental Machine Specialties, Inc., Minneapolis, Minn.

FILTER CLOTH—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

FILTERS—Air
American Air Filter Co., Inc., Louisville, Ky.

FILTERS—OIL
National Acme Co., The, Cleveland.

FILTERS—Pressure or Gravity
Scaife, Wm. B., & Sons Co., Pittsburgh.

FIRE BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Quigley Co., Inc., 56 West 45th St., N. Y. C.

FIRE CLAY
Carborundum Co., The, Perth Amboy, N. J.
Illinois Clay Products Co., Joliet, Ill.
Keagler Brick Co., Steubenville, Ohio
West Virginia Fire Clay Mfg. Co., Pittsburgh.

FITTINGS—Brass, Pipe and Tube
Commonwealth Brass Corp., Detroit.

FLANGES—Forged Steel
Harrisburg (Pa.) Steel Corp.
Standard Steel Wks. Co., Burnham, Pa.

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Worth Steel Co., Claymont, Del.

FLEXIBLE SHAFT EQUIPMENT
Lovejoy Flexible Coupling Co., Chicago.
Strand, N. A., & Co., Chicago.

FLOODLIGHTS—Acetylene
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

FLOOR ARMORING
Acme Steel Co., Chicago, Ill.

FLOOR (CONCRETE) REPAIR MATERIALS
Flexrock Co., 892 N. Delaware Ave., Phila., Pa.

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Johns-Manville Corp., 22 East 40th St., New York City.

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Bravo Corp., Pittsburgh.
Hendrick Mfg. Co., Carbondale, Pa.

FLOORING—Steel
American Pressed Steel Co., Phila., Pa.

FLUX—Welding
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

FORGING MACHINES—Roll
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Acme Machinery Co., Cleveland.
Ajax Mfg. Co., The, Euclid, Ohio.

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National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

FORGINGS—Brass, Bronze or Copper
American Brass Co., The, Waterbury, Conn.
Commonwealth Brass Corp., Detroit.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

FORGINGS—Coin Pressed
Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop, Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., Erie, Pa.
Billings & Spencer Co., Hartford, Conn.
Canton (Ohio) Drop Forging & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Forging & Casting Corp., The, Ferndale, Mich.
Poor & Co., Canton Forge & Axle Wks., Canton, Ohio
Rockford (Ill.) Drop Forge Co.
Storms Drop Forging Co., Springfield, Mass.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Williams, J. H., & Co., Buffalo, N. Y.

FORGINGS—Hollow
Harrisburg (Pa.) Steel Corp.
National Forge & Ordnance Co., Irvine, Pa.

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American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

FORGINGS—Hydraulic Press, Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem (Pa.) Steel Company.
Mesta Mch. Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa.
Standard Steel Wks. Co., Burnham, Pa.

FORGINGS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

FORGINGS—Upset
Bethlehem (Pa.) Steel Company.
Lamson & Sessions Co., The, Cleveland.
Rockford (Ill.) Drop Forge Co.

FORMING AND COILING MACHINES
Peck, Stow & Wilcox Co., The, Southington, Conn.

FORMING MACHINES—Roll
Kane & Roach, Inc., Syracuse, New York.

FOUNDRY EQUIPMENT & SUPPLIES
Whiting Corp., Harvey, Ill.

FURNACE ENGINEERS
Electric Furnace Co., The, Salem, Ohio.
Flinn & Dreffein Co., Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.
Wilson, Lee Engineering Co., The, Cleveland.

FURNACES—Annealing & Case Hardening
American Gas Furnace Co., Elizabeth, N. J.
Electric Furnace Co., The, Salem, Ohio.
Leeds & Northrup Co., Philadelphia.
Surface Combustion Corp., 2375 Dorr St., Toledo.
Wilson, Lee Engineering Co., The Cleveland.

FURNACES—Billet or Ingot Heating
Flinn & Dreffein Co., Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Brass Melting
Monarch Engineering & Mfg. Co., The, Baltimore, Md.

FURNACES—Electric, Steel Melting
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
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Pittsburgh (Pa.) Lectromelt Furnace Corp.

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Electric Furnace Co., The, Salem, Ohio.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Forging
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Holcroft & Co., Detroit.
Surface Combustion Corp., 2375 Dorr St., Toledo.
Wilson, Lee Engineering Co., The, Cleveland.

FURNACES—Heat Treating, Automatic
Amer. Gas Furnace Co., Elizabeth, N. J.
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Holcroft & Co., Detroit.
Leeds & Northrup Co., Philadelphia.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Surface Combustion Corp., 2375 Dorr St. Toledo.

FURNACES—Heat Treating, Cyanide of Lead
Chicago (Ill.) Flexible Shaft Co.
Electric Furnace Co., The, Salem, Ohio.
Surface Combustion Corp., 2375 Dorr St., Toledo.

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Maehler, Paul Co., The, Chicago.
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES—Heat Treating, Oil or Gas
Chicago (Ill.) Flexible Shaft Co.
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.
Maehler, Paul Co., The, Chicago.
Monarch Engineering & Mfg. Co., The, Baltimore, Md.
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Surface Combustion Corp., 2375 Dorr St., Toledo.
Wilson, Lee Engineering Co., The, Cleveland.

FURNACES—Pack Heating Sheets
Aetna-Standard Engineering Co., The Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

FURNACES—Rivet Heating, Electric
General Electric Co., Schenectady, N. Y.

FURNACES—Wire, Annealing and Galvanizing
General Electric Co., Schenectady, N. Y.
Surface Combustion Corp., 2375 Dorr St., Toledo.

GAGE BLOCKS
Ford Motor Co. (Johansson Division), Dearborn, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

GAGES—Dial
Starrett, L. S., Co., Athol, Mass.

GAGES—Electric
Sheffield Gage Corp., Dayton, Ohio.

GAGES—Plug and Snap
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

GAGES—Pressure & Vacuum Recording
Brown Instrument Co., The, Philadelphia, Pa.

GAGES—Temperature
Weston Electrical Instrument Corp., Newark, N. J.

GAGES—Thickness, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

GAGES—Thread Lead
Jones & Lamson Mch. Co., Springfield, Vt.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio.

GALVANIZING
Castle, Joseph P., & Bros., Phila.

GALVANIZING COMPOUNDS
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

GALVANIZING PLANTS—For Sheets
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Erie (Pa.) Foundry Co.

GAS ANALYSIS RECORDERS
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

GAS FOR INDUSTRIAL USES
American Gas Association, 420 Lexington Ave., N. Y. C.

GAS PRODUCERS
Flinn & Dreffein Co., Chicago.
Koppers Co., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., & Co., Philadelphia.

GAS RECOVERY COKE OVENS
Koppers Co., Pittsburgh.

GASKETS—Asbestos, Metal or Rubber
Garlock Packing Co., The, Palmyra, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

GASKETS—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

GEAR CUTTING
Earle Gear & Machine Co., Phila.
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Philadelphia (Pa.) Gear Works.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

GEAR CUTTING MACHINES
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.

GEAR DRIVES—Herringbone
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

GEARMOTORS
Allis-Chalmers Mfg. Co., Milwaukee.
James, D. O., Mfg. Co., Chicago.
Reliance Electric & Engng. Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.

GEAR PLANNING MACHINES
Gleason Works, Rochester, N. Y.

GEARS—Bevel
Boston Gear Wks., Inc., North Quincy, Mass.
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Richardson Co., The, Melrose Park, Ill.

GEARS—Heat Treated
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Simonds Mfg. Co., Pittsburgh.

GEARS—Herringbone
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Mesta Mch. Co., Pittsburgh.
Philadelphia (Pa.) Gear Works.

GEARS—Machine Cut
Boston Gear Wks., Inc., North Quincy, Mass.
Cleveland (Ohio) Worm & Gear Co.
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Simonds Mfg. Co., Pittsburgh.

GEARS—Machine Molded
Poole Foundry & Mch. Co., Baltimore, Md.

GEARS—Non-Metallic
Boston Gear Wks., Inc., North Quincy, Mass.
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
General Electric Co., Schenectady, N. Y.
James, D. O., Mfg. Co., Chicago.

GEARS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

GEARS—Steel, Silent
Waldron, John, Corp., New Brunswick, N. J.

GEARS—Spur
Boston Gear Wks., Inc., North Quincy, Mass.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Philadelphia (Pa.) Gear Works.
Simonds Mfg. Co., Pittsburgh.

GEARS—Worm
Boston Gear Wks., Inc., North Quincy, Mass.
Cleveland (Ohio) Worm & Gear Co.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Philadelphia (Pa.) Gear Works.

GENERATORS—Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

GENERATORS—Electric
Fairbanks, Morse & Co., Chicago.
Lincoln Electric Co., The, Cleveland.
Reliance Electric & Engng. Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.

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Safety Equipment Service Co., Cleveland.

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Safety Equipment Service Co., Cleveland.

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Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

GRABS—For Sheets and Coils
J-B Engineering Sales Co., 1738 Orange St., New Haven, Conn.

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GREASE—Lubricating
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

GRILLES—Metal Cane
Diamond Mfg. Co., Wyoming, Pa.

GRILLES—Perforated Metal
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforated Co., Chicago.

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Excelsior Tool & Mch. Co., E. St. Louis, Ill.
Norton Co., Worcester, Mass.
Production Machine Co., Greenfield, Mass.

GRINDING MACHINES—Belt
Production Machine Co., Greenfield, Mass.

GRINDING MACHINES—Broach
Thompson Grinder Co., Springfield, Ohio.

GRINDING MACHINES—Centerless
Cincinnati (Ohio) Grinders Incorporated.

GRINDING MACHINES—Cutter & Reamer
Cincinnati (Ohio) Milling Mch. Co., The.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Cylinder
Heald Mch. Co., Worcester, Mass.
Hutto Machine Division, Carborundum Co., Detroit.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati (Ohio) Grinders Incorporated.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Die
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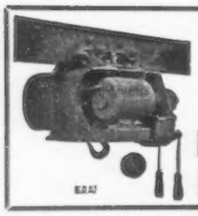

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Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Norton Co., Worcester, Mass.

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Nazel Engineering & Machine Works, Philadelphia.

HAMMERS—Chipping & Riveting—Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS—Drop
Billings & Spencer Co., Hartford, Conn.
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Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.
Standard Machinery Co., Providence, R. I.

HAMMERS—Helve
Bradley, C. C., & Son, Inc., Syracuse, N. Y.

HAMMERS—Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS—Portable Electric
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HAMMERS—Power
Bradley, C. C., & Son, Inc., Syracuse, N. Y.
Chambersburg (Pa.) Engineering Co.

HAMMERS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elson Ave.

HAMMERS—Steam
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.

HANGERS—Ball Bearing
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

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Central Iron & Steel Co., Harrisburg, Pa.
Worth Steel Co., Claymont, Del.

HEADS—Steel—Flanged & Dished
Central Iron & Steel Co., Harrisburg, Pa.

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Holden, A. F., Co., New Haven, Conn.

HEAT TREATING
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General Machine Wks., York, Pa.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Holden, A. F., Co., New Haven, Conn.
Parish Pressed Steel Co., Reading, Pa.

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Holden, A. F., Co., New Haven, Conn.

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Holden, A. F., Co., New Haven, Conn.
Maehler, Paul Co., The, Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

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Dravo Corp., Pittsburgh.

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Holden, A. F., Co., New Haven, Conn.

HOISTS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Detroit (Mich.) Hoist & Mach. Co.
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Northern Engineering Works, Detroit.
Ridgway, Craig & Son Co., Coatesville, Pa.

HOISTS—Chain
Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric
American Engineering Co., Philadelphia.
Detroit (Mich.) Hoist & Mach. Co.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Maris Brothers, Inc., Philadelphia.
Northern Engineering Works, Detroit, Mich.
Philadelphia (Pa.) Gear Works.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

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American Monorail Co., The, Cleveland.
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Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

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Euclid Crane & Hoist Co., The, Euclid, O.
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Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOISTS—Scraper
Sullivan Machinery Co., Claremont, N. H.

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HOSE—Flexible Metallic
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Wood, R. D., & Co., Philadelphia.

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Shenango-Penn Mold Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.
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Weston Electrical Instrument Corp., Newark, N. J.

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Western Wire Prods. Co., St. Louis, Mo.

KEYSEATING MACHINES
Baker Bros., Inc., Toledo, Ohio.
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

LACING—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LAGGING—Insulating
Quigley Co., Inc., 56 West 45th St., N. Y. C.

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LAMPS—Mercury Vapor
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LAPPING MACHINES
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LATHES—Automatic
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Davenport (Iowa) Locomotives Works.
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Gasoline
Plymouth (Ohio) Locomotive Works.

LOCOMOTIVES—Gas-Electric
Davenport (Iowa) Locomotives Works.

LOCOMOTIVES—Industrial
Davenport (Iowa) Locomotives Works.
Plymouth (Ohio) Locomotive Works.

LOCOMOTIVES—Steam
Iron & Steel Products, Inc., Chicago.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., The, Cleveland.

LUBRICANTS—Crusher & Grinding
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Gear
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—High Pressure & Temperature
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mine Cars
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mining Machines
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Railroad
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Roll Neck—Anti-Friction & Plain
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Tipple & Cleaning
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco; Shell Bldg., St. Louis, and 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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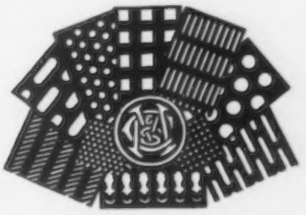

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Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago, Ill.
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Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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OXYGEN
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Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

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Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

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Johns-Manville Corp., 22 East 40th St., New York City.

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Shenango-Penn Mold Co., Pittsburgh.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

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Inland Steel Co., Chicago.

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Jones & Laughlin Steel Corp., Pittsburgh.
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Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

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Pennsylvania Pump & Compressor Co., Easton, Pa.
Ruthman Machinery Co., Cincinnati.
Tomkins-Johnson Co., The, Jackson, Mich.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Coolant
Ruthman Machinery Co., Cincinnati.

PUMPS—Electric
Fairbanks, Morse & Co., Chicago.

PUMPS—Hydraulic
Aldrich Pump Co., The, Allentown, Pa.
American Engineering Co., Philadelphia.
Elmes, Chas. F., Engng. Wks., Chicago.
Fairbanks, Morse & Co., Chicago.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Power
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Rotary Positive, Centrifugal & Turbine
Crane Co., Chicago.

PUMPS—Steam
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Vacuum
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES & DIES
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

PUNCHING AND SHEARING MACHINES
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Excelsior Tool & Mach. Co., E. St. Louis, Ill.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Niagara Machine & Tools Works, Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Mach. Mfg. Co., Pittsburgh.

PYROMETERS—Indicating
Brown Instrument Co., The, Philadelphia, Pa.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., Philadelphia.

RAIL SPLICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Foster, L. B., Co., Inc., Pittsburgh.
Frank, M. K., 480 Lexington Ave., N. Y. C.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

RAILS—Relaying
Hyman-Michaels Co., Chicago.
Iron & Steel Products, Inc., Chicago.
Sherwood, E. C., 50 Church St., N. Y. C.

RAILWAY EQUIPMENT & SUPPLIES
Fairbanks, Morse & Co., Chicago.
Iron & Steel Products, Inc., Chicago.

REAMERS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

REAMING MACHINES
Blanchard Machine Co., The, Cambridge, Mass.

RECORDERS—Furnace Atmosphere
Brown Instrument Co., The, Philadelphia, Pa.

REELS—For Coil Stock
Littell, F. J., Mch. Co., Chicago.

REFRACTORIES
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Cleveland (Ohio) Quarries Co., The.
Illinois Clay Products Co., Joliet, Ill.
West Virginia Fire Clay Mfg. Co., Pittsburgh.

REGULATORS—Compressed Gas
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

REINFORCEMENT FABRIC—Concrete
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

RETORTS—Alloy
Electro Alloys Co., Elyria, Ohio.

RIDDLES—Foundry
Ludlow-Saylor Wire Co., St. Louis, Mo.

RINGS—Iron or Steel
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Co., Burnham, Pa.

RINGS—Welded
American Welding & Mfg. Co., Warren, O.

RIVET MAKING MACHINERY
Acme Machinery Co., Cleveland.
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

RIVET SETS
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

RIVETING MACHINES
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Hanniffin Mfg. Co., Chicago.
Shuster, F. B., Co., The, New Haven, Ct.

RIVETS
Blake & Johnson Co., The, Waterville, Ct.
Clark Bros. Bolt Co., Milldale, Conn.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS—Aluminum
Aluminum Co. of America, Pittsburgh.

RODS—Brass
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

RODS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave. Midland, Mich.

RODS—Nickel Silver
American Brass Co., The, Waterbury, Conn.
Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

RODS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

RODS—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Electric Arc Cutting & Welding Co., The, Newark, N. J.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Una Welding, Inc., Cleveland, Ohio.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

RODS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Youngstown (Ohio) Sheet & Tube Co., The.

ROLLING MACHINERY—Cold Rolling
Cold Metal Process Co., The, Youngstown, Ohio.
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Pttgh.

ROLLING MACHINERY—Sheet Metal
Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Cold Metal Process Co., The, Youngstown, Ohio.
Farrel-Birmingham Co., Inc., Ansonia, Ct.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Fdry. Co., Avonmore, Pa.
Standard Machinery Co., Providence, R. I.
United Engineering & Fdry. Co., Pttgh.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

ROLLING MILLS—Copper Rod & Sheet
Torrington (Conn.) Mfg. Co., The.

ROLLS—Alloy Steel
Pittsburgh (Pa.) Rolls Corp.

ROLLS—Bending and Straightening
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bertsch & Co., Cambridge City, Ind.
Kane & Roach, Inc., Syracuse, New York.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

ROLLS—Rubber Covered
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

ROLLS—Sand Chilled Iron and Steel
Aetna-Standard Engineering Co., The Youngstown, Ohio.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
National Roll & Fdry. Co., Avonmore, Pa.
Pittsburgh (Pa.) Rolls Corp.
United Engineering & Fdry. Co., Pttgh.

ROLLS—Special Hardened
Midvale Co., The Nicetown, Phila., Pa.

ROOFING—Special Copper Bearing Steel
Superior Sheet Steel Co., Canton, Ohio.

ROOFING AND SIDING—Corrugated and Plain
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Johns-Manville Corp., 22 East 40th St., New York City.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

ROOFING AND SIDING—Iron and Steel
Inland Steel Co., Chicago.

ROOFING & SIDING—(Zinc)—Corrugated & Plain
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ROOFING MATERIALS
Carey, Philip, Co., The, Cincinnati.

RUBBER LININGS
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.

RUBBER MOLDED PARTS
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Richardson Co., The, Melrose Park, Ill.

RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Midland Paint & Varnish Co., The, Cleveland.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING PROCESS
American Chemical Paint Co., Ambler, Pa.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

RUST REMOVING
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

SAND BLAST EQUIPMENT AND MACHINES
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Panghorn Corporation, Hagerstown, Md.

SAND BLAST STEEL SHOT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT
Bartlett, C. O.-Snow Co., The, Cleveland.

SAWING MACHINES—Metal
Espen-Lucas Mch. Works, Phila.
Peerless Mch. Co., Racine, Wis.

SAWING MACHINES—Metal-Band
Continental Machine Specialties, Inc., Minneapolis, Minn.

SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
Wells Mfg. Corp., Three Rivers, Mich.

SAWS—Circular, Rip & Cutoff
Atkins, E. C., & Co., Indianapolis.

SAWS—Friction
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Hack Saw Blades
Atkins, E. C., & Co., Indianapolis.
Peerless Mch. Co., Racine, Wis.
Starrett, L. S., Co., Athol, Mass.

SAWS—Hot Metal
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold
Disston, Henry, & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Portable Electric
Black & Decker Mfg. Co., The, Towson, Md.

SCALES
Exact Weight Scale Co., Columbus, Ohio.
Fairbanks, Morse & Co., Chicago.
Streeter-Amet Co., Chicago.

SCREENS—Perforated Metal
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire
Ludlow-Saylor Wire Co., St. Louis, Mo.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SCREW MACHINE PRODUCTS
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Blake & Johnson Co., The, Waterville, Ct.
Commonwealth Brass Corp., Detroit.
Eastern Mch. Screw Corp., New Haven.
Houde Engineering Corp., Buffalo, N. Y.
Metal Electric Processing Co., The, Toledo, Ohio.
National Acme Co., The, Cleveland.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.
Progressive Mfg. Co., Torrington, Conn.
Screw Mch. Products Corp., Prov., R. I.

SCREW MACHINERY—Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW MACHINERY—Hand
Warner & Swasey Co., The, Cleveland.

SCREW MACHINERY—Multiple Spindle
Acme Machine Tool Co., Cincinnati.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW PLATES
Greenfield (Mass.) Tap & Die Corp.

SCREW STOCK
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

SCREWS—Cap
Cleveland (Ohio) Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS—Coach or Lag
Lamson & Sessions Co., The, Cleveland.

SCREWS—Machine
Blake & Johnson Co., The, Waterville, Ct.
Lamson & Sessions Co., The, Cleveland.
Progressive Mfg. Co., The, Torrington, Ct.

SCREWS—Safety Set
Progressive Mfg. Co., The, Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Set
Cleveland (Ohio) Cap Screw Co., The.
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

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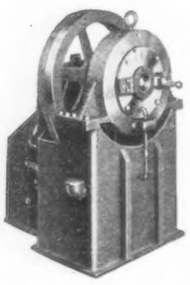

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Products Index

SCREWS, Socket, Head, Cap
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb
Parker-Kalon Corp., 196 Varick St., N. Y.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N.Y.

SECOND - HAND MACHINERY—(See Clearing House Section)

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milkauwee.
Ohio Electric Mfg. Co., The, 5998 Maurice Ave., Cleveland.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

SHAFTING—Cold Drawn
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAFTING—Forged
Bay City Forge Co., Erie, Pa.

SHAFTING—Steel
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

SHAFTING—Turned and Ground
Bliss & Laughlin, Inc., Harvey, Ill.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPERS
Cincinnati (Ohio) Shaper Co., The.

SHAPERS—Vertical
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

SHAPES—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPES—Wire
American Spring & Mfg. Corp., Holly, Mich.
Cuyahoga Spring Co., The, Cleveland.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Roebling's, John A. Sons Co., Trenton, N. J.

SHEAR BLADES & KNIVES
American Shear Knife Co., Homestead, Pa.
Canton Fdry. & Mch. Co., Cleveland.

SHEARING MACHINES—Alligator
Canton Fdry. & Mch. Co., Cleveland.

SHEARING MACHINES—Angle, Hand and Power
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

SHEARING MACHINES—Bar
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pitgh.

SHEARING MACHINES — Beam and Channel
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pitgh.

SHEARING MACHINES—Billet
Morgan Engineering Co., The, Alliance, O.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pitgh.

SHEARING MACHINES — Continuous Sheet & Pack
Aetna-Standard Engineering Co., The, Youngstown, Ohio.

SHEARING MACHINES—Plate
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pitgh.

SHEARING MACHINES — Sheet and Plate
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N. Y.

SHEARING MACHINES—Squaring
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N. Y.

SHEARS—Hand for Sheet Metal
Bremil Mfg. Co., Erie, Pa.

SHEET BARS
Jones & Laughlin Steel Corp., Pittsburgh.

SHEET METAL MACHINERY
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Kane & Roach, Inc., Syracuse, New York.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Peck, Stow & Wilcox Co., The, Southington, Conn.
V & O Press Co., Hudson, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

SHEETS—Aluminum
Aluminum Co. of America, Pittsburgh.

SHEETS—Auto Body
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Black
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Granite City (Ill.) Steel Co.
Ingersoll Steel & Disc Co., Chicago.
Inland Steel Co., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos., T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

SHEETS—Blue Annealed
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Great Lakes Steel Corp., Detroit.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.

SHEETS—Brass, Bronze, Copper, Nickel, Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

SHEETS—Chrome
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Chrome Nickel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Cold Rolled
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos., T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.

SHEETS—Copper Alloy
American Brass Co., The Waterbury, Conn.

SHEETS—Copper Steel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.

SHEETS—Electrical
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Cleveland, Ohio.

SHEETS—Enameling
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.

SHEETS—For Drawing and Stamping
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Worth Steel Co., Claymont, Del.

SHEETS—Full Finished
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Galvanized, Flat and Corrugated
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
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Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

SHEETS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

SHEETS—Metal Furniture
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Cleveland, Ohio.

SHEETS—Pickled
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Tin Mill Black
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Zinc
New Jersey Zinc Co., The, 160 Front St.,

SHELVING—Steel
Frick-Gallagher Mfg. Co., The, Wellston, Ohio.

SHOVELS—Mounted—See Cranes

SHUTTERS—Steel & Wood Bi-Folding
Kinnear Mfg. Co., Columbus, Ohio.

SILICO—MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SILICON METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SLINGS—Wire Rope
Murray Safety Sling Co., Inc., Pitts., Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

SLOTTING MACHINES
Nazel Engineering & Machine Works, Philadelphia.

SOLVENTS—Oil & Grease
Detroit Rex Products Co., Detroit, Mich.

SPACING TABLES—Punching & Shearing
Thomas Mach. Mfg. Co., Pittsburgh.

SPECIAL MACHINERY
Baldwin-Southwark Corp., Southwark Div. Philadelphia.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Bullard Co., The, Bridgeport, Conn.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Farquhar, A. B., Co., Ltd., York, Pa.
Gifford-Wood Co., Hudson, N. Y.
Houde Engineering Corp., Buffalo, N. Y.
Manville, E. J., Mch. Co., Waterbury, Ct.
Morgan Engineering Co., The, Alliance, O.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Wood, R. D., & Co., Philadelphia.

SPECIALTIES—Rubber Covered & Lined
Goodrich, B. F., Co., The, Akron, Ohio.

SPEED REDUCERS
Boston Gear Wks., Inc., North Quincy, Mass.
Cleveland (Ohio) Worm & Gear Co.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 1401 Roosevelt Rd, Chicago.
Link-Belt Co., Chicago.
Philadelphia (Pa.) Gear Works.
Poole Foundry & Mch. Co., Baltimore, Md.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SPIKES—Screw
Oliver Iron & Steel Corp., Pittsburgh.

SPIKES—Track
Ames, W., & Co., Jersey City, N. J.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

SPINDLES—Grinding
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

SPINDLES—Hollow Bored
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

SPLICE BARS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SPRAY FINISHING EQUIPMENT
DeVilbiss Co., The, Toledo, Ohio.

SPRAYERS—Metal
Metals Coating Co. of America, Phila., Pa.

SPRAYERS—Paint
DeVilbiss Co., The, Toledo, Ohio.

SPRING MAKING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington (Conn.) Mfg. Co., The.

SPRINGS—Car
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.

SPRINGS—Extension, Compression, Torsion or Flat
Amer. Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Peck Spring Co., The, Plainville, Conn.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SPROCKETS
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Boston Gear Wks., Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

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Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Central Iron & Steel Co., Harrisburg, Pa.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
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Crosby Co., The, Buffalo, N. Y.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
E S M C O Auto Products Corp., Bush Terminal Bldg. 27, Bklyn., N. Y.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Lansing (Mich.) Stamping Co., So. Penn. Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Metal Electric Processing Co., The, Toledo, Ohio.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
O'Connor, Hugh, 1268 Mission St., San Francisco, Calif.
Parish Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
Sessions, J. H., & Son, Bristol, Conn.
Special Hardware Co., Medford, N. Y.
Toledo (Ohio) Stamping & Mfg. Co.
Torrington (Conn.) Company
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Truscon Steel Co., Pressed Steel Div., Cleveland.
Wagner Specialty Co., Burlington, Wis.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co.

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Noble & Westbrook Mfg. Co., The, East Hartfrod, Ct.

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American Steel Export Co., Inc., 347 Madison Ave., N. Y. C.
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Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
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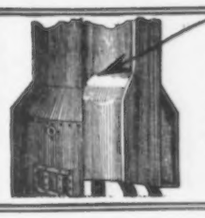
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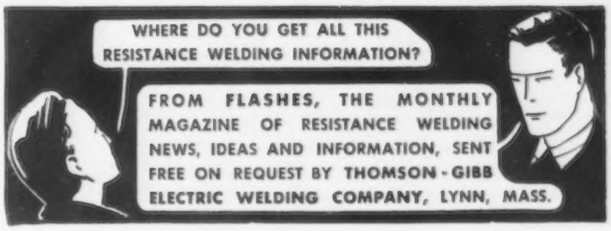
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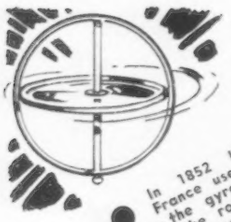

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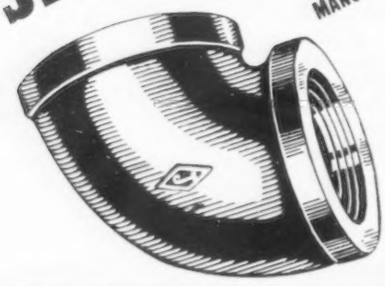

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Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

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Union Drawn Steel Co., Massillon, Ohio.

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American Steel Export Co., Inc., 347 Madison Ave., N. Y. C.
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STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., The, Warren, Ohio.

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Griffin Mfg. Co., Erie, Pa.

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Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.

STEEL—Drill
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Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.

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Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

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Cleveland (Ohio) Twist Drill Co., The.
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Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.
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Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Pgh.
Weirton (W. Va.) Steel Co.

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Thomas Steel Co., The, Warren, Ohio.

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Griffin Mfg. Co., Erie, Pa.
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Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

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Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Spring
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Barnes, Wallace, Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
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STEEL-Stainless
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American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
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Ludlum Steel Co., Watervliet, N. Y.
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Babcock & Wilcox Co., The, 85 Liberty St., New York City.

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TANKS—Welded
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Landis Mach. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
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TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

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TIE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

TIES—BALE
Acme Steel Co., Chicago, Ill.

TIN PLATE
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

TIN PLATE MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TOOL BITS
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.
Williams, J. H., & Co., Buffalo, N. Y.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOLS—Metal Cutting
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

TOOLS—Precision
Starrett, L. S., Co., Athol, Mass.

TOOLS—Safety, Steel Stamp
Cunningham, M. E., Co., Pittsburgh.

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

TORCHES—Brazing, Cutting and Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

TRACTORS AND TRAILERS — See Trucks, Tractors and Trailers—Industrial

TRAILERS—Industrial—See Trucks, Tractors and Trailers—Industrial

TRAMRAILS—Overhead Systems
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

TRAMWAYS—Wire Rope
Leschen, A., & Sons Rope Co., St. Louis, Mo.

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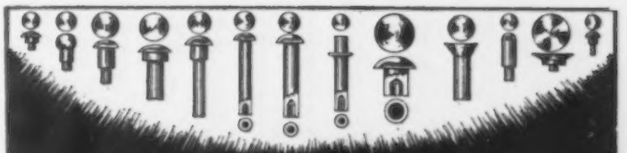

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TRANSCRIBING MACHINES
Dictaphone Sales Corp., 420 Lexington Ave., New York City.

TRANSMISSIONS—Hydraulic
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

TRANSMISSIONS—Variable Speed
Link-Belt Co., Chicago.
Reeves Pulley Co., Columbus, Indiana.

TRAPS—Steam
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

TREADS—Safety
American Pressed Steel Co., Phila., Pa.
Blaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Norton Co., Worcester, Mass.

TROLLEYS
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1761 Elston Ave., Chicago.

TRUCKS—Dump (Industrial)
Towmotor, Inc., Cleveland.

TRUCKS—Elevating (Power)
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Barrett-Cravens Co., Chicago.
Elwell-Parker Electric Co., The, Cleveland.
Towmotor, Inc., Cleveland.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Factory, Hand
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

TRUCKS—Lift (Hand & Foot)
Barrett-Cravens Co., Chicago, Illinois.
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.
Yale & Towne Mfg. Co., The, Phila Div., Phila., Pa.

TRUCKS—Scoop (Industrial)
Towmotor, Inc., Cleveland.

TRUCKS, TRACTORS AND TRAILERS—Industrial
Atlas Car & Mfg. Co., The, Cleveland.
Baker-Raulang Co., The, 2175 W. 25 St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
Towmotor, Inc., Cleveland.
Yale & Towne Mfg. Co., The, Phila., Div., Phila., Pa.

TUBE MILL MACHINERY
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Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdry. Co., Pgh.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

TUBES—Boiler
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., Shelby, Ohio.
Pittsburgh (Pa.) Steel Co.
Steel & Tubes, Inc., Cleveland.

TUBES—Copper Alloy
American Brass Co., The, Waterbury, Conn.

TUBES—High Carbon
Ohio Seamless Tube Co., Shelby, Ohio.
Steel & Tubes, Inc., Cleveland.

TUBES—Nickel Silver
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

TUBES—Stainless Steel
Cleveland (Ohio) Tool & Supply Co., The.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ryerson, Jos., T. & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.

TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

TUBING—Flexible Metallic
Pennsylvania Flexible Metallic Tubing Co., Philadelphia.

TUBING—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

TUBING—Nichrome
Steel & Tubes, Inc., Cleveland.

TUBING—Open Seam
Steel & Tubes, Inc., Cleveland.

TUBING—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

TUBING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

TUBING—Seamless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., Shelby, Ohio.
Pittsburgh (Pa.) Steel Co.
Ryerson, Jos. T. & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBING—Square and Rectangular
Steel & Tubes, Inc., Cleveland.

TUBING—Stainless Steel
Cleveland (Ohio) Tool & Supply Co., The.
Steel & Tubes, Inc., Cleveland.

TUBING—Tinned Brass or Copper
Bundy Tubing Co., Detroit, Mich.

TUBING—Tinned-Steel
Bundy Tubing Co., Detroit, Mich.

TUBING—Tool Steel
Bissett Steel Co., The, Cleveland.

TUBING—Welded Steel
Bundy Tubing Co., Detroit, Mich.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., Shelby, Ohio.
Steel & Tubes, Inc., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBULAR PRODUCTS
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes, Inc., Cleveland.

TUMBLING BARRELS—See Barrels—Tumbling

TUNGSTEN—Metals & Alloys
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

TUNGSTEN CARBIDE
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TURBINE-GENERATORS—Steam
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TURBO-COMPRESSORS
Spencer Turbine Co., Hartford, Conn.

TURNTABLES
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

TURNTABLES—Industrial
Canton Fdry. & Mch. Co., Cleveland.

TWIST DRILLS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

TYPE—Steel
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

UNIONS
Crane Co., Chicago.

UNIT HEATERS—Electric
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.

VALVES—Acid Resisting
Dietzel Lead Burning Co., Pittsburgh.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

VALVES—Air Blast for Presses
Littell, F. J., Mch. Co., Chicago.

VALVES—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia, Pa.
Galland-Henning Mfg. Co., Milwaukee.
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Hannifin Mfg. Co., Chicago.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

VALVES—Gas, Water and Steam
Brown Instrument Co., The, Philadelphia, Pa.
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.
North American Mfg. Co., The, Cleveland.
Wood, R. D., & Co., Philadelphia.

VALVES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Crane Co., Chicago.
Galland-Henning Mfg. Co., Milwaukee.
Wood, R. D., & Co., Philadelphia.

VALVES—(Pressure Seated) Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.

VALVES—Proportioning
Brown Instrument Co., The, Philadelphia, Pa.
North American Mfg. Co., The, Cleveland.

VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.

VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

VARNISH—Acid Resisting
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

VISES
Cincinnati (Ohio) Milling Mch. Co., The.
Jarecki Mfg. Co., Erie, Pa.

WASHERS—Iron or Steel
Sessions, J. H., & Son, Bristol, Conn.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

WASHERS—Lock
American Nut & Bolt Fastener Co., Pittsburgh.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
Hobbs Mfg. Co., Worcester, Mass.
Houde Engineering Corp., Buffalo, N. Y.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.
Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHERS—Spring
American Nut & Bolt Fastener Co., Pittsburgh.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.

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Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.
Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHING MACHINES—for Metal Parts
Ransohoff, N., Inc., Cincinnati.

WASTE—Wiping
Lillie, Dexter P., Co., New Bedford, Mass.

WATER SOFTENERS AND PURIFIERS
Scalfe, Wm. B., & Sons Co., Ptgh.

WELDING—Copper Hydrogen Electric
Rundy Tubing Co., Detroit, Mich.

WELDING—Electric
Federal Machine & Welder Co., Warren, Ohio.
Lincoln Electric Co., The, Cleveland.
Una Welding, Inc., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING CONTACTORS
Clark Controller Co., The, Cleveland.

WELDING CONTACTS—Resistance
Electroloy Co., Inc., 50 Church St., New York City.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

WELDING FIXTURES
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Una Welding, Inc., Cleveland, Ohio.

WELDING MACHINES—Butt
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Electric Arc
Electric Arc Cutting & Welding Co., The, Newark, N. J.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.
Una Welding, Inc., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

WELDING MACHINES—Electric Arc, Second-Hand. (See Clearing House Section)

WELDING MACHINES—Flash
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Press
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.

WELDING MACHINES—Seam
Federal Machine & Welder Co., Warren, Ohio.

WELDING MACHINES—Spot
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Universal Spot & Arc
Electric Arc Cutting & Welding Co., The, Newark, N. J.

WHEELS—Rolled Steel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Standard Steel Wks. Co., Burnham, Pa.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.

WIRE—Barb
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

WIRE—Electric Heat Resisting
Globar Div., The Carborundum Co., Niagara Falls, N. Y.

WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Prentiss, Geo. W., & Co., Holyoke, Mass.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Insulated
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Mattress
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Netting
Ludlow-Saylor Wire Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Cortland, N. Y.

WIRE—Piano and Music
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Special Drawn Shapes
Rathbone, A. B. & J., Palmer, Mass.

WIRE—Spring
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Spring (Music)
Webb Wire Works, New Brunswick, N. J.

WIRE—Stainless Steel
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Rustless Iron & Steel Corp., Baltimore, Md.
Webb Wire Works, New Brunswick, N. J.

WIRE—Steel
Bethlehem (Pa.) Steel Co.
Prentiss, Geo. W., & Co., Holyoke, Mass.
Wickwire Brothers, Cortland, N. Y.

WIRE—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Una Welding, Inc., Cleveland, Ohio.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH
Buffalo (N. Y.) Wire Wks. Co., Inc.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE DRAWING MACHINERY—See Wire Mill Mchry. & Equip.

WIRE FORMING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Manville, E. J., Mch. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.
U. S. Tool Co., Inc., Ampere, N. J.

WIRE MILL MACHINERY AND EQUIPMENT
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington (Conn.) Mfg. Co., The.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

WIRE NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE PRODUCTS
American Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Buffalo (N. Y.) Wire Wks. Co., Inc.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hindley Mfg. Co., Valley Falls, R. I.
Pittsburgh (Pa.) Steel Co.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE ROPE
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE ROPE FITTINGS
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic
Shuster, F. B., Co., The, New Haven, Ct.

WRENCHES
Armstrong Bros. Tool Co., Chicago.
Billings & Spencer Co., Hartford, Conn.
Williams, J. H., & Co., Buffalo, N. Y.

WRENCHES—Pipe
Greenfield (Mass.) Tap & Die Corp.

WRENCHES—Pneumatic
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

ZINC—SLAB (Spelter)
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ZINC—Strip
Platt Bros. & Co., The, Waterbury, Conn.

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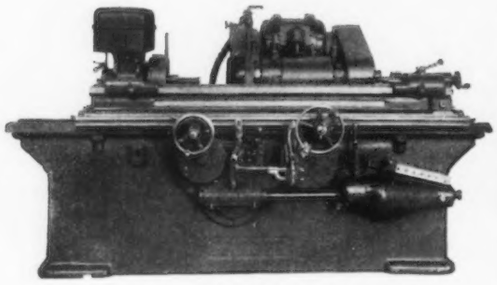
No. 2-B K. & T. pl., M.D.
No. 2-B, No. 3-B B.&S. pl.
No. 3-B Milwaukee, Pl.
No. 2, No. 3 Cinn. pl.
No. 4-B B. & S. Plain
No. 4 Cincinnati plain
No. 1½ B. & S. Univ.
No. 2 B. & S. Univ.
No. 4 Cinn. Univ.
No. 2, No. 3 Cinn. Vert.
No. 3-B Milwaukee Vert.
No. 5-B, No. 6 Becker
18" & 24" Cinn. Duplex
No. 5 Cincinnati Hydro.
6"x14" P. & W. Thread
6"x48" P. & W. Thread
Hanson-Whitney Thread

PLANERS
24"x24"x 6' American
30"x30"x 6' Gray
30"x30"x14' Gray
36"x36"x 8', 12' Cincinnati
44"x36"x12' Gray
42"x42"x30' Niles-Bement-Pond, Arr. Rev., M.D.
48"x48"x10' D. & H., O.S.
48"x48"x16' N-B-P
60"x48"x16' Gray
60"x48"x20' Hamilton
72"x60"x16' American

SHAPERS
16" Walcott
16" Stockbridge
24" Gould & Eberhardt

TURRET LATHES
No. 4 W. & S. Univ.
No. 1-A W. & S.
No. 2-A W. & S.
No. 3 Cinn.-Acme
No. 3-A W. & S. Tim. Brg.
No. 4-A W. & S. 7⅝" H. S.
No. 4-L Gisholt

GRINDERS
NORTON MOTOR DRIVEN
FULLY GUARANTEED



10"x50" Norton Plain Grinder, Motor Drive

THESE SIZES IN STOCK:

6"x32"	10"x50"	14"x50"
10"x18"	10"x72"	14"x72"
10"x24"	10"x96"	14"x96"
10"x36"	14"x36"	16"x50"
	18"x96"	18"x144"

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AUTOMATICS
100% REBUILT FOR IMMEDIATE DELIVERY

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1—1¼" Four Spindle Cone
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1—No. 452 New Britain
1—No. 454 New Britain
1—No. 33 New Britain
1—4¼" Model L, S. S. Gridley
1—9/16" Model G, Gridley
1—1⅛" Model GA, Gridley
2—4" Model H, Gridley Chuckers
1—2¾" Model A, Cleveland
1—⅞" Model A, Cleveland
1—⅝" Model A, Cleveland
1—⅝" Model B, Cleveland
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2—1¼"x18" Cleveland Shaft Machines
2—1½"x18" Cleveland Shaft Machines

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GRINDERS, No. 13 Br. & S. Univ. (3)
GRINDER, Pratt & Whitney Surface, Ball Brg., M.D.
GRINDERS, No. 70 Heald, Internal (3)
GRINDER, No. 70 Heald Duplex, Double Spindle

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LATHE, 30"x10' Reed, M.D., Taper Attachment
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MILL, Nos. 2 & 3 Brown & Sharpe, Vert., M.D.
MILLS, Nos. 1½A, 2A & 2B Milwaukee & B. & S.
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1—60" Cincinnati Vertical
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1—48" x 48" x 18' Cincinnati, M.D.
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1—100" Gould & Eberhardt Hobber

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Riveter, Hanna ⅞" capacity, 30 ton
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10' Ryerson, Belt Driven. Capacity ½" Plate. Top Roll 12", Bottom Rolls 9" diameter
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50" National 17 Roll, 3⅝" diameter rolls
60" National 17 Roll, 4½" diameter rolls
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No. 304 Bliss, 18" Between Uprights, 1" Stroke

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No. 268¼ Toledo, Area of Bed 60½"x84", Stroke of Blankholder 15½", Stroke of Plunger 29"
No. 1018 Bliss, Area of Bed 72"x60", Stroke of Blankholder 12", Stroke of Plunger 24", 1500 ton Ram Pressure
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450 ton Birdsboro 4-Column Flanging Press, 8'x12' Between Columns, 10' Daylight
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Three High Bar Mill for rolling 8" wide sheet Bars 30' long. Complete with electric driven feed and tilting tables, runout tables, bull head electric driven thru Fawcus Gear. Electric driven pusher for cooling table
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8"x8"x1" Long & Allstatter, Arranged for geared motor drive

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Garrison Bar Shear Arranged for Motor Drive. Length of Blade 9 1/16". Capacity 5" Rounds

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42" King. One plain and one turret head. Power rapid traverse

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No. 5, type I Nazel, motor drive

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16"x8' & 16"x10' Lodge & Shipley selective geared head, motor drive

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24" Bullard Vertical. New Era and Rapid Production types

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Gould & Eberhardt Cutter Grinder.
Gould & Eberhardt Gear Cutter, No. 2120.
Pratt & Whitney Thread Miller, 14 x 6, Pan Type.
Barrett Cylinder Boring Mill, 5-inch Bar.
Whitcomb 4-head Planer, 42 x 42 x 16'.
Woodward & Powell 4-head Planer, 42 x 42 x 15.
Sellers Vertical Car Wheel Boring Mill, 48-inch Rotary Table.
Gleason Lathe, 48" swing, 13' bed, Dbl. Back Geared, Plain Change, 3-step Cone, Internal Drive.
Gage Lathe, 114" Swing, 15' Bed, 5-step Cone, Cone Drive, Plain Change Gear.
Planer with 2 Heads, 7 x 18', suitable for planing stone.
Cincinnati-Bickford Radial Drill, 6 Foot, Single Pulley Drive.
Lodge & Shipley Engine Lathe, Geared Head, Single Pulley Drive, 20" x 10'.
Cincinnati Planer, 36 x 36 x 72", 2 Heads, Belt Driven.
Hendy Lathe, 14 x 6, Overarm.
Bells Forging Hammer, Air 2000 lbs. Capacity.
Bausch Multiple Drill Press, Rectangular Head, 8 Ball Bearing Morse Tapered Spindles, with 20"—"T" Slotted Box Table.

KAMIS MACHINERY COMPANY
3rd & Moore Sts., Philadelphia, Pa.

HEAVY DUTY PLATE DRILL

80 Spindle Hill Drill No. 1-F equipped with 80 No. 3 M. T. heads and 25 No. 5 M. T. heads adjustable for center distance on the rail; 26' between housings; motor driven. Write for full specifications and photograph.

Many Other High Grade Machines

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2100-2300 Fletcher Ave. Indianapolis, Ind.
Drexel 3300.

Nos. 2 & 4 Cincinnati Vertical Mills, S.P.D.
No. 14 Cochrane-Bly Duplex Miller and Shaper, rotary table and dividing head.
8"-12"-16" Heald Rotary Surface Grinders.
1½" Cap. Landis Bolt Threader, geared head, motor drive, with lead screw.
6' and 8' Bertsch Power Square Shears, 3/16" Cap.
No. 74½ Bliss Press, S.S., tie rod, 8" str.
Nos. 2 & 2A Brown & Sharpe Univ. Millers, M.D.

VICTOR MACHINERY COMPANY
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ENGINE LATHE
72" x 40'
PUTNAM—MOTOR DRIVE
12 SPEED GEARED HEAD

CINCINNATI PLANER
72" x 72" x 12'
3 Heads—Rapid Traverse—Box Table
Self Contained Motor Drive—Late Type

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SURFACE GRINDER
12"x48" Diamond belt drive, reconditioned.

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Automatic Can Machinery
Bodymakers—Flangers
Double Seamers—Bliss No. 81
Slitters—Testers

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26" x 120" LANDIS GRINDER
Self Contained — Motor Drive

BENNETT-RAFKIN MACHINERY CORP.
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USED and REBUILT CAN MACHINERY
Slitters • Seamers • Flangers
Bodymakers • Thread Rollers • Can Testers
Inquiries Invited

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60" x 60" x 14' NILES-BEMENT-POND Planer, 3 heads, rapid traverse, forced lubrication, box table, reversing motor drive; like new.

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839 Grant Street Buffalo, N. Y.

You will have something to be thankful for on January 6, 1938 if you will make your reservation now for the ANNUAL REVIEW NUMBER to be published on that date!

TRUSTEES' SALE

Estate Vulcan Smithing Coal Company, Bankrupt, No. 20015

MACHINERY and EQUIPMENT of COAL MINE, FRIEDENS, PA.

Near Somerset, Pa., South of Johnstown
To be sold at Auction
Tuesday, December 7, 1937, at 10 A. M.
On the premises

HOISTS: 24 Brownie, Saro, Lidgerwood and Treadwell Mine Boom Hoists; Single and Double Drum.

FANS: Sirocco, Robinson and Jeffreys Exhaust, Circulating and Booster 12 to 72" Self-contained and Silent Chain Drive Fans.

MINE CARS: 185 Cars with Wood Bodies and Steel Frames 36" Gauge. 122 All Steel Cars 36" Gauge.

LOCOMOTIVES: 11 Jeffrey, Goodman and General Electric 4 to 15-Ton Capacity Hauling Locomotives.

MINING MACHINERY: 9 Goodman and Jeffrey Low Vein and Artwall Mining Machines; 6 and 7 ft. Cutting Bars.

PUMPS: 38 Worthington, Weinman, Harris Deming, Dravo, Scranton, Viking, Wheeler and Stein Centrifugal and Plunger Pumps 2 x 2 to 8 x 10 with Bronze and Cast Casings. All direct connected to 1 to 100 H.P. A. C. and D. C. motors.

DRILLS: Little Giant Portable Rock Drill; Fort Wayne Electric Drill Mounted on Steel Truck.

MACHINE SHOP EQUIPMENT: South Bend 15" x 7' Quick Change Lathe; Robertson Hack Saws; Drill Presses; Band Saws; Chain Hoists; Small Tools, Jacks, etc.

RAIL: 95,000 feet 20-, 30- and 50-lb. Rail.

WIRE: 45,000 feet Trolley Wire, 4° and 6°.

GENERATOR SETS: 4 General Electric and Ridgway 150 K.W. Motor Generator Sets connected to 250 H.P. Synchronous Motors.

MOTORS: 1 to 100 H.P. Electric Motors, Compensators, Transformers and other equipment.

SUPPLIES: Hercules, Gelatin and Pellett Powder; Large Quantities of New Replacement Parts; Locomotives; Mining Machines; Cars; Electrical Equipment; 100 Tons Coal, Etc.

TIPPLES: 150 to 175 tons per hour capacity Structural Steel Tipples.

MISCELLANEOUS EQUIPMENT: 200 Tons Scrap, New Wire, Car Haulers, Loader and Rock Lorry, Mine Timber, Etc.

OFFICE FURNITURE and Office Equipment.

By order of Morris Weisman, Lloyd M. Walker, James P. McGranery } Trustees

Hirschwald, Goff & Rubin, Esqs., Philadelphia, Pa. } Attorneys for
Leonard Sobel, Esq., Johnstown, Pa. } Trustees

Descriptive catalogue upon application to

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27 William St., New York — 80 Federal St., Boston

FORGING MACHINE

1½" Acme All Steel, 8" stroke, for motor drive. Weight 18,000 lbs. Used very little. Fine condition. Attractive price.

PRESSES

95-E Toledo D.C., D.B.G. Tie-Rod, 10" stroke, 85" betw. housings, friction clutch. Spring knockout, for motor drive. In excellent condition.

59¼ Toledo S.C., D.B.G. Tie-Rod, bed 40x40", 8" stroke, Fctn Clutch, B.D., Good.

78½ Bliss S.C., D.B.G., Tie-Rod, 10" stroke.

77½ Bliss S.C., D.B.G., Tie-Rod, 8" stroke, with Marquette Cushions.

57 Toledo S.C., D.B.G., 16" stroke, bed 24"x24", Friction Clutch, for belt drive.

MARR-GALBREATH MACHINERY CO.
55 Water Street, PITTSBURGH, PA.

No. 95E TOLEDO DOUBLE CRANK PRESS, Ram 74" x 9". Tie Rod.
No. 59¼ TOLEDO S.S. TIE ROD PRESS.
600 TON TOLEDO KNUCKLE JOINT EMBOSSING PRESS.
400 TON FERRACUTE E.G. 54 Embossing Press.
DOUBLE ANGLE SHEARS: Kling 6 x 6 x 1"; 8 x 8 x 1".
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BULLDOZERS: Nos. 1, 2, 3, 4 and 26; Also No. 24 Vertical Williams White.
UPSETTING and FORGING MACHINES: 1" to 5".
5000 lb. ERIE DOUBLE FRAME FORGING HAMMER.
NAZEL HAMMERS: 1B, 3B, 5N.
BUFFALO BAR SHEAR: No. 8 for rounds, flats and structural shapes.
400 TON WHEEL PRESS.
PRESSES: Solid Back and Incl. Nos. 1, 2, 3 and 4. Also Trimming Presses.
STRUCTURAL MACHINERY: Punches, etc.
TENSILE TESTERS: 20,000, 40,000 and 200,000 lb.
WIRE STRAIGHTENERS: ¼" to ⅝".
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NIAGARA SHEAR: 10' x 18 ga.
YODER SLITTER: 36" x 16 ga.
AIR COMPRESSORS and SAND-BLASTS.
HEAT TREATING FURNACES.
BOLT, NUT and RIVET MACHINES: Cold and Hot Headers; Cold and Hot Nut Machines; Threaders; Trimmers; Thread Rollers; Slotters; Stud Threaders; Tappers; Burring Machines; etc.

DONAHUE STEEL PRODUCTS CO.
74th St. & Ashland Ave. Chicago, Ill.

BIG PRESSES

#168¾ Toledo Toggle Drawing & Deep Stamping Press, double geared; 56½x50" bolster plate; 26" stroke. Weight approx. 124,000#.

#268¼ Toledo Double Crank Toggle Drawing & Deep Stamping Press; 84¾" between uprights; 58x77" blankholder; 29" stroke of plunger with 8" adjustment; weight approx. 175,000#.

Both machines in excellent condition and available for immediate shipment.

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10' & 12' SQUARING SHEARS

Made by United Engineering Co.
Capacity 3/16"—¼"—5/16". Gap 16—22—30—36

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Brake, 10' x 10 ga. Ohl, press type
Bulldozer, No. 9 Williams-White
Gang Slitter, Braddock, 36" x 11 gauge
Press, No. 58 Toledo S.S., grd., 35,000 lbs.
Presses, Nos. 6 & 7A Niagara, OBI, grd.
Shear, No. 2120 Niagara, 10' x 14 ga.

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1—No. 645 BLISS High Speed Blanking Press, double roll feeds, M.D.; excellent condition.

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BLISS, TOLEDO, V & O, ETC.
REBUILT—GUARANTEED

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TRUSTEES' SALE IN LIQUIDATION

Machinery & Equipment

Girard Smelting & Refining Co.

Milnor & Bleigh Streets, Tacony, Phila., Pa.

To be sold at PUBLIC AUCTION

Wednesday & Thursday, December 8th & 9th, 1937

At 10 A. M. on the Premises

Machinery & Equipment Blast furnaces and conveyors, white metal and copper furnaces, complete conveyor system, rotary ingot furnaces, portable jaw crusher, steel melting pots and kettles, Ingersoll-Rand air compressors, Doelger & Kuster and Canton shears, portable welding machine, hydraulic and metal baling presses, magnets, portable compressors, oil fired boiler and steam pump, ball mill and conveyor, rotary roasting furnace, locomotives, sets of pouring equipment, rotary blowers and motors, centrifugal pumps and motors, flat cars, skip buckets, pouring ladles, clam shell buckets, slag pots, wheelbarrows, hand trucks, buggies, moulds, etc.

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Complete Machine Shop including Cincinnati shaper, Sidney & Hendy machine lathes, drill presses, power hack saw, motors, blowers, chain hoists, small tools, etc. Weighing and beam scales.

Mack and G. M. C. Trucks, Automobiles and Complete Garage Equipment

Complete Laboratory, Large Quantity of Office Equipt.

Inspection: Tuesday, December 7th, 1937, Between 10 A. M. and 4 P. M.

By order of the Liquidating Trustees

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GET THE EXTRA VALUE OF *Performance Testing*

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No. 3½-B Bliss, will draw and lift out 5½", wt. 21,000 lbs.
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No. 13 Bliss, will draw and lift out 12½", wt. 70,000 lbs.
No. 300 Henderson, will draw and lift out 4", wt. 8000 lbs.
No. 301-A Henderson, will draw and lift out 6", wt. 17,000 lbs.
No. 302-A Henderson, will draw and lift out 5½", wt. 24,000 lbs.

All in Excellent Condition

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COMPLETE FORGING PLANT

2,500 lb. Chambersburg steam or air combination drop and forging hammer, double frame with 2 sets of flat dies.
Ingersoll-Rand XB compressor 14-9x12, 450 cu. ft. with Condor one piece belt.
75 HP. West. motor C2 220V. 3 ph. 60C. 700 RPM compensator and pulley.
360 cu. ft. receiver. OTHER EQUIPMENT.

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H.P.	MAKE	VOLTS	TYPE	SPEED
1500	G.E.	440/220	ATI-Synch.	180
1500	West.	2200	C.W.-Slipring	440
1000	West.	2400	Synch.	900
850	West.	2200	C.W.-Slipring	440
500	Al. Chal.	4000/2300	Slipring	500
450	West.	440/220	Synch.	257
450/360	West.	2200	C.W.-Slipring	875/700
400	G.E.	4150/2300	MT-Slipring	390
375	G.E.	2300	ATI-Synch.	600
350	CR. WH.	2300/440	Synch.	720
300	West.	440/220	C.W.-Slipring	1800
250	G.E.	4000/2300	M.T.-Slipring	257
250	CR. WH.	440/220	128Q-Slipring	435
250	West.	440/220	C.W.-Slipring	585
225	Elec. Machry.	4150/2300	3-BRG.-Synch.	450

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1 Keller No. E-202 Die Sinking Machine, motor driven, like new.
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No. 1, No. 2, and No. 3 Baird four slide wire machines.

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All Types and Sizes
Rebuilt-Guaranteed

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SURPLUS MACHINERY AND MOTORS

	H.P.	Speed	Volts	Make	Price
2—400 3 ph.	60 cy.	500	2200	Westinghouse	$800
1—250 3 ph.	60 cy.	585	440	S.R. C.W.	450
5—15 D. C.		500/1000	550	G.E.	290
2—20 D. C.		500/1000	550	G.E.	340
1—Rock River Punch 48" Throat, Architectural Jaw. Price					850
1—50-Ton Industrial Bay City Wreck Crane					4,500
1—20-Ton Browning Loco. Crane.....					4,000
1—25-Ton Industrial Bay City Loco. Crane					5,000
1—20-Ton McMyler Loco. Crane.....					4,000
1—15-Ton Browning Loco. Crane.....					3,500
1—15-Ton Morgan Bridge Crane 68' Span					
1—10-Ton Toledo Ore Crane 1½ yd. Bucket 60' Span					

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ELECTRIC—355 ft., 528 ft., 676 ft. 807 ft., 1302 ft., 1728 ft. 2022 ft., 3600 ft. & 5000 ft.
STEAM—368 ft., 500 ft., 800 ft., 1221 ft., 1640 ft., 2200 ft. & 3000 ft.
DIESEL—368 ft., 603 ft., 900 ft. & 1300 ft.

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SQUIR. CAGE MOTORS	220 H.P. Cr. Wh. 720 RPM 150 H.P. G.E. 600 RPM 125 H.P. Al. Ch. 1750 RPM 100 H.P. G.E. 900 RPM 100 H.P. West. 720 RPM 75 H.P. G.E. 900 RPM 75 H.P. G.E. 720 RPM 75 H.P. Al. Ch. 600 RPM 75 H.P. G.E. 450 RPM 60 H.P. G.E. 1200 RPM 50 H.P. G.E. 1200 RPM 50 H.P. Ridgway 3600 RPM
A.C. GEN.	200 K.W. G.E. 720 RPM 150 K.W. Al. Ch. 900 RPM 150 K.W. G.E. 900 RPM 90 K.W. G.E. 900 RPM 75 K.W. G.E. 1200 RPM 45 K.W. G.E. 1200 RPM 30 K.W. West. 1200 RPM
MOTOR GEN. SETS	100 K.W. G.E. 230 V. 100 K.W. G.E. 115 V. 50 K.W. G.E. 230 V. 30 K.W. West. 230 V.
115 V. D.C. MOTORS	90 H.P. G.E. 900 RPM 50 H.P. G.E. 1750 RPM 40 H.P. G.E. 400/600 RPM
230 V. D.C. MOTORS	150 H.P. G.E. 1750 RPM 100 H.P. West. 625 RPM 75 H.P. Burke 1140 RPM 75 H.P. West. 850 RPM 75 H.P. E.D. 400 RPM 60 H.P. West. 1200 RPM 60 H.P. E.D. 500/1200 RPM 50 H.P. G.E. C0181082, 725/1800 RPM 30 H.P. G.E. 825/2000 RPM 15 H.P. G.E. 600/1800 RPM 15 H.P. G.E. 500/2000 RPM 10 H.P. G.E. 400/1600 RPM 10 H.P. G.E. 575/1725 RPM
550 V. D.C. MOTORS	60 H.P. G.E. 1700 RPM 50 H.P. G.E. 1200 RPM 10 H.P. G.E. 1075 RPM
ELEC. WELDERS	500 amp. West. Multiple Operator 100 amp. Hobart Portable
ELEC. HOISTS	5 Ton G.E. 230 V. 3 Ton Shepard 230 V. 2 Ton G.E. A.C. 1 Ton Euclid A.C.
PLATERS	5000 amp. Boissier Mtr. Driven

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Steel railway type pin-connected Bridge, 14'-8" clearance, two sections 101' each, Cooper's E-40, approx. 125 tons capacity; excellent condition, priced very reasonably account immediate removal necessary.

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CARS and LOCOMOTIVES
2—21-ton Porter S/T, 36" G.
1—90-ton 0-8-0 Switcher, 15'6" W.B.
30 TON S. G. GAS SWITCHING LOCO.,
AUTO. DUMP CARS, S. G. unless noted
36— 5-ton Western, 36" Steel, Ex. cond.
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50—10,000 Gal. Tank Cars, Cheap.
Nordberg track shifter.
Also Hoppers, Gons., Flat, Box, etc.
6½ YD. BUCYRUS ELECTRIC SHOVEL
BUILDINGS
62'x400' with crane runway.
New Shop Bldg., never erected. 445'x730'; five-section for 20-ton Cranes. Will split.
500 steel sash.
ALSO OTHER BUILDINGS.
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1—15-ton Brownhoist loco. type with Gen.
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1—20-ton O&S, loco. type.
1—2-yd. Monighan dragline.
2—Mine Hoists, electric, 100 & 200 H.P.
NEW G. E.: O. H. CRANE MOTORS
Replace your old ones cheaply!
28—3 to 50 HP Var. & Const. Speed Motors.
9, 50 HP; 8, 25 HP; 7, 20 HP; 2/60/440.
Ball-bearing Slip-ring with Brakes & A-B controls.
HOWELL, AC, 3-60; 9, 3; 6, 5; 5, 10; 3, 15 HP.
1, 300 KW, 600V DC Rotary Con. & Trans. 6 PH.
ENGINES, GENERATORS, ETC.
1—1000 KW G.E. con. Turbo-Gen. 3/60/2300.
3— 938 KVA non-con. Turbo-Gen. 3/60/2300.
3— 500 KW G.E. con. Turbo-Gen, 3/60/2300.
1—50 HP, 1—20 HP, 1—5 HP steam.
1—each, 75, 100 & 150 KW DC eng.-gens.
2—120/175 HP Winton gasoline engines.
1—40" x 60" & 1, 48" x 100' steel smoke stacks.
150 KVA—3/60/220 Belted.
BOILERS, ETC.
2—350 HP, 4—500 HP B. & W. with super heaters & chain-grate stokers.
1—50 HP, 1—100 HP fire box.
2—2000 HP open feed Water Heaters.
AIR COMPRESSORS
1—1800 C.F. I.R. steam driven.
1— 888 C.F.—I.R. Type XB2 Belted.
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PUMPS
1—10" full manganese, gravel.
2—1000 GPM—350 FH Motor Driven.
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1— 450 GPM—350 FH Turbine Driven.
15—Misc., elec. & steam.
MERCHANT STEEL NEW
35 tons Rounds & 5 tons Flats, Kansas.
11 tons SAE 3140 Half Rounds, Texas.
TINPLATE COBBLESS
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2000 tons Prepared Steel & Cast., Carolinas.
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USED STEAM AND ELECTRICAL EQUIPMENT

Steam Turbines, Motor Generator Sets, Belted and Direct Connected A.C. and D.C. Generating Units, Boilers, Rotary Converters, Motors, Transformers, Etc.

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1578' Chicago Compressor type O.C.B.
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458' XRB 2-stage Ingersoll-Rand and motor
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58" Diam. Paxson Cupola 7/9 ton capacity.

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2 to 10 ton A.C. Traveling and Stationary, 60' to 100' Radius, Full Swing. Operative inspection by appointment. Extraordinary values NOW. *Also Overhead Cranes and Hoists.*

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11—50 ton 40 ft. Flat Cars
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WANTED

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and perusal of our detail advertisement on page 159 of the Classified Section.

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CASTINGS

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BRASS, BRONZE AND ALUMINUM CASTINGS

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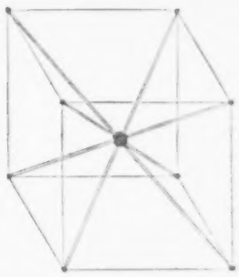
a specialty
CONTRACT MACHINE WORK
requiring large machine tools

MURRAY IRON WORKS COMPANY
BURLINGTON, IOWA

BUSINESS OPPORTUNITIES

Procurement Division, Public Buildings Branch, Washington, D. C., Nov. 16, 1937.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Dec. 21, 1937, for construction of the U. S. P. O., at Meyersdale, Pa. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Assistant Director, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Buildings Branch.



Sensational invention in the line of superstructure! *To engineering and superstructure firms* I would confer licenses of my practically proved and several times patented invention of a *new constructional element of metal*, special design and combination of forces, characterized by simple tie construction, high capacity with little own weight, multiple application, cheap production, American Patent No. 1995248. Serious applicants are invited to write to ALEX HERMAN, Berlin, O 27, Alt-Stralau 21, Germany.

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The Iron Age, 239 W. 39th St., New York

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ESTIMATOR AND DESIGNER Concrete Reinforcing Steel. State experience, references, age and salary expected. Address Box S-475, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

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AVAILABLE EXPERIENCED FOUNDRYMAN. Metallurgist, superintendent, or manager. Gray and malleable irons. Cupola and electric furnace practice. Production and jobbing work. Light, medium, and heavy castings. B.S. and M.S. degrees in metallurgy. Best of references. Address Box S-463, care *The Iron Age*, 239 W. 39th St., New York.

SALES EXECUTIVE, machine tool salesman, sales engineer and chief executive, can handle most difficult sales and marketing problems. Trained engineer with broad legal experience. Address Box S-403, care *The Iron Age*, 239 W. 39th St., New York.

CAPABLE EXECUTIVE. Experienced in manufacturing and selling a fabricated steel building material. Have supervised a small plant, buying raw material and figuring costs, etc. Address Box S-462, care *The Iron Age*, 239 W. 39th St., New York.

TRAVELING SALESMAN, competent, aggressive, experienced. Wide acquaintance with industrials, City, State, Federal Departments, Middle Atlantic States, seeks connection. Address Box S-274, care *The Iron Age*, 239 W. 39th St., New York.

MANAGER OR SUPERINTENDENT. A-1 mechanic and executive, with record of results, would consider substantial investment with reliable going concern. Address Box S-468, care *The Iron Age*, 239 W. 39th St., New York.

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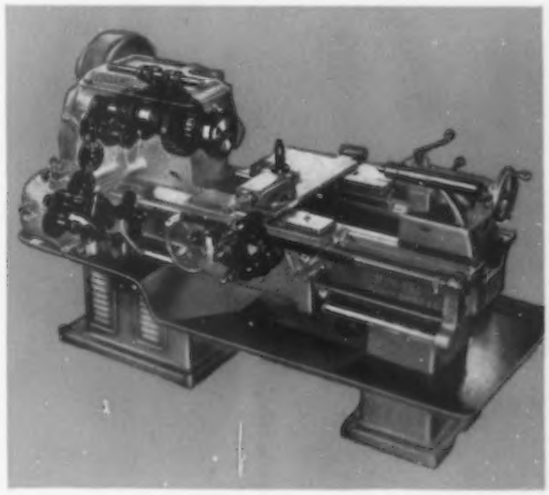
● The streamlined flier pictured above is the "Super-Chief," Atchison's new light-weight train which makes the run between Chicago and Los Angeles (2,228 miles) in 39 hours, 45 minutes. Such fast time is made possible, because this train of eight cars weighs only half as much as the steam train which it replaces. And responsible for this appreciable weight-reduction is the use of a modern alloy of Nickel, stainless steel. The principle of light-weight construction employed by the Edward G. Budd Manufacturing Co. calls for the use of stainless chromium nickel steel which is fabricated by the Budd "shotweld" process. When you consider the saving in fuel costs and the saving in costs of maintaining road bed and rails, it's easy to understand the constantly growing popularity of stainless steel construction. Perhaps there's equipment in your line of business where the high strength-weight ratio of the Nickel Alloy Steels may be used to bring about worthwhile economies.

● At the left we have another striking example of the cost-reducing advantages of another Nickel Alloy Steel composition. This huge crusher shaft of 3½% Nickel Steel with about .30% carbon, was made by Bethlehem Steel for the General Crusher Stone Co., Easton, Pa. Installed in 1906 it was still going strong in 1930. It was retired from service then, but only because the crusher was obsolete. When equipment parts stand such gruelling service for 24 years, they've certainly paid for themselves over and over again. But that's characteristic of the Nickel Alloy Steels.



● If you have a grumbling gear in your plant it's fairly safe to wager it isn't made of Nickel Alloy Steel. The dark detail in the phantom cut pictured here shows a typical installation of gears and other parts made of Nickel Alloy Steels. The lathe is a product of The Monarch Machine Tool Company, of Sidney, Ohio. Nickel Alloy Steels by Crucible Steel Company of America. Maintenance costs are kept low with Nickel steel gears because they have such high resistance to wear, shock and fatigue.

If frequent gear failures is one of your problems, or if you want to be sure your production cycle has no vulnerable points, Nickel Alloy Steel gears are the ones to specify.

THE INTERNATIONAL NICKEL COMPANY, INC., NEW YORK, N. Y.

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

The trade mark "TIMKEN" identifies a growing family of American-made quality products. This family now numbers 6, including the TIMKEN Tapered Roller Bearing born more than 40 years ago. All are noted for outstanding performance in their various spheres, as listed below. It will pay you to make this trade-mark your guide when buying such products as those it is associated with.

TIMKEN TAPERED ROLLER BEARINGS

Used and preferred in leading makes of automobiles, trucks, tractors and industrial equipment of all kinds.

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For locomotives, cars and streamlined trains. An impressive majority of American locomotives and streamliners are Timken-equipped.

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Have revolutionized rock drilling and rock drilling costs in mines, quarries and construction work Drill faster last longer

TIMKEN ALLOY STEELS

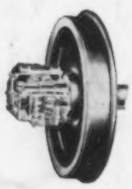
Electric furnace and open hearth. Manufactured in all standard and special analyses. Noted for high quality and consistent uniformity

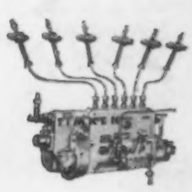
TIMKEN SEAMLESS STEEL TUBES

For all mechanical purposes and high temperature applications. Quality controlled from raw material to finished product

TIMKEN FUEL INJECTION EQUIPMENT

For Diesel and semi-Diesel engines of 1 to 8 or more cylinders. Assures increased power, smoother operation and greater economy





THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO